The Long-Horned Wood-Boring Beetles of North Dakota (Coleoptera: Cerambycidae)

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Abstract

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Presents biological résumés for 73 species of cerambycids found in North Dakota. Information consists of distribution and emergence records, larval food habits, parasites, predators and some comments on rearing techniques.

Keywords: Shelterbelt insects, Cerambycidae, wood borers, insect behavior.

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Rocky Mountain Forest and Range Experiment Station[1]

[1]Forest Service, U.S. Department of Agriculture, with central headquarters maintained at Fort Collins, in cooperation with Colorado State University. Research reported here was conducted at the Station's Shelterbelt Laboratory at Bottineau, in cooperation with the North Dakota State University—Bottineau Branch and Institute of Forestry. Stein was Associate Entomologist at the Shelterbelt Laboratory when the research was done; his present address is Institute of Pacific Islands Forestry, Pacific Southwest Forest and Range Experiment Station, Honolulu, Hawaii; Tagestad is Biological Technician at the Shelterbelt Laboratory, Bottineau, North Dakota.

Contents

Introduction

Much has been written about the long-horned wood-borers, but the information is scattered throughout various journals. This publication includes a brief biological résumé of those found in North Dakota, augments existing information in the literature, and provides a reference for entomological workers in the Northern Plains. The alphabetical list of cerambycids contains 73 species in 42 genera; excluded are several specimens of *Acmaeops, Ataxia, Cortodera, Hyperplatys,* and *Mecas* that could not be identified to species. Common names are included where known.

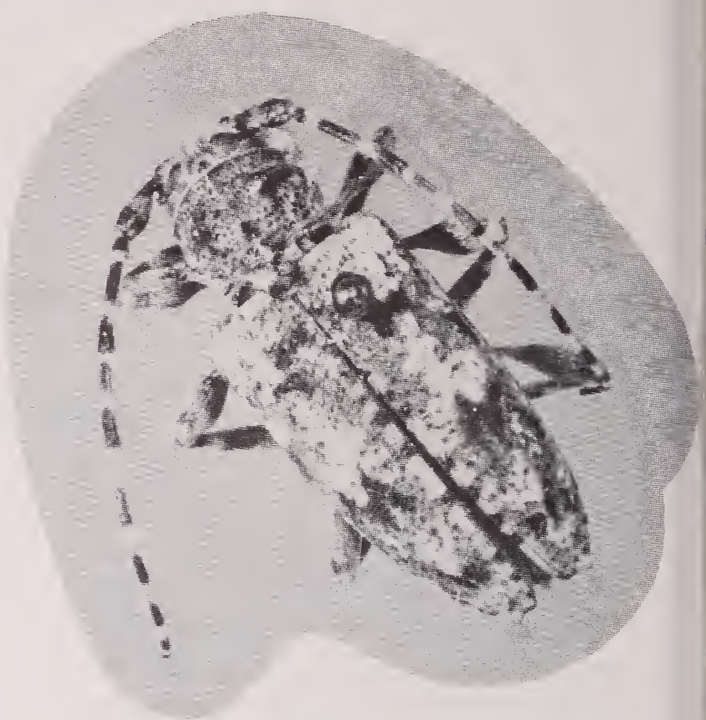
Distribution and emergence records for each species, unless otherwise specified, represent only North Dakota information gathered from specimens at the USFS Shelterbelt Laboratory at Bottineau, North Dakota State University at Fargo, or private collections. If a collection date is specified without mention of a collection method, the information was not with the labeled specimen and we assumed that the beetle was collected by sweeping with a net. All additional information concerning parasites, predators, host material, biological habits, and rearing techniques is based upon the literature in general or our own observations in particular.

A cerambycid index by host plant is provided at the end of the text. It includes only those native and introduced host species found in North Dakota. A more inclusive list of host material will be found in the text associated with each insect species.

The authors are indebted to Dr. R. D. Gordon for collection information, to Dr. R. L. Post for providing information and loan of specimens to photograph, and to Mr. William H. Tyson for determining our collection and also providing specimens to photograph.

Aegoschema modestum (Gyllenhal)

[Subfamily:Lamiinae]



SIZE. 1.2 cm.

DISTRIBUTION. Richland County (fig. 1).

HOSTS. *Carya* (Beutenmuller 1896); *Acer, Prunus* (Blackman and Stage 1924); *Carpinus caroliniana, Fraxinus nigra, Liriodendron tulipifera; Tilia americana, Fagus grandifolia, Prunus avium* (Champlain et al. 1925); *Pinus virginiana* (Perry 1975).

COMMENTS. Adults were collected in North Dakota on June 16. According to Blackman and Stage (1924), the female beetle deposits eggs in dead wood from 1 to 3 years old, usually at the base of a smaller dead limb or around bark injuries. The larval galleries are packed with fine frass, and parallel the wood grain just beneath the bark. The pupal chamber extends diagonally into the wood approximately 3 cm. The normal life cycle is 1 year.

This species has been recorded as breeding in dead wood of hickory (Beutenmuller 1896), linden, tulip poplar, black ash, sweet cherry, blue beech (Champlain et al. 1925), and Virginia pine (Perry 1975). It has also been reported as common on oak (Blackman and Stage 1924).

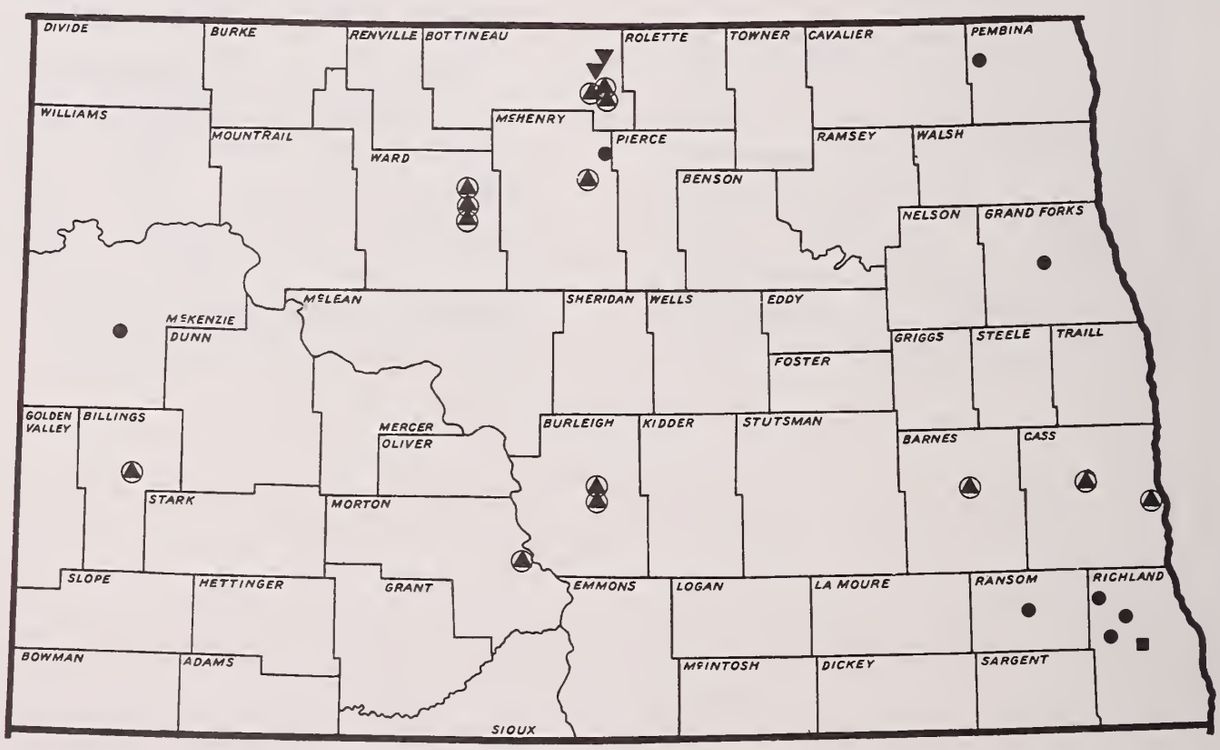


Figure 1.—Distribution of *Aegoschema modestum* (■), *Anoplodera minnesotana* (●), *Arhopalus foveicollis* (▼), and *Astyleiopus variegatus* (▲).

Anoplodera minnesotana (Casey)

[Subfamily:Lepturinae]

SIZE. 1.6 cm.

DISTRIBUTION. Grand Forks, McHenry, McKenzie, Pembina, Ransom, and Richland Counties (fig. 1).

HOSTS. *Ulmus americana, Nyssa aquatica* (Knull 1946); *Carya, Ulmus, Prunus serotina, Picea rubra* (Baker 1972); *Pinus virginiana* (Perry 1975).

COMMENTS. Adults were collected from June 6 to July 19 by sweeping flowers or using a pane trap in riverbottom stands of green ash and American elm (Knull 1946). *Anoplodera minnesotana* has been successfully reared on artificial diet (Gardiner 1970).

Arhopalus foveicollis (Haldeman)

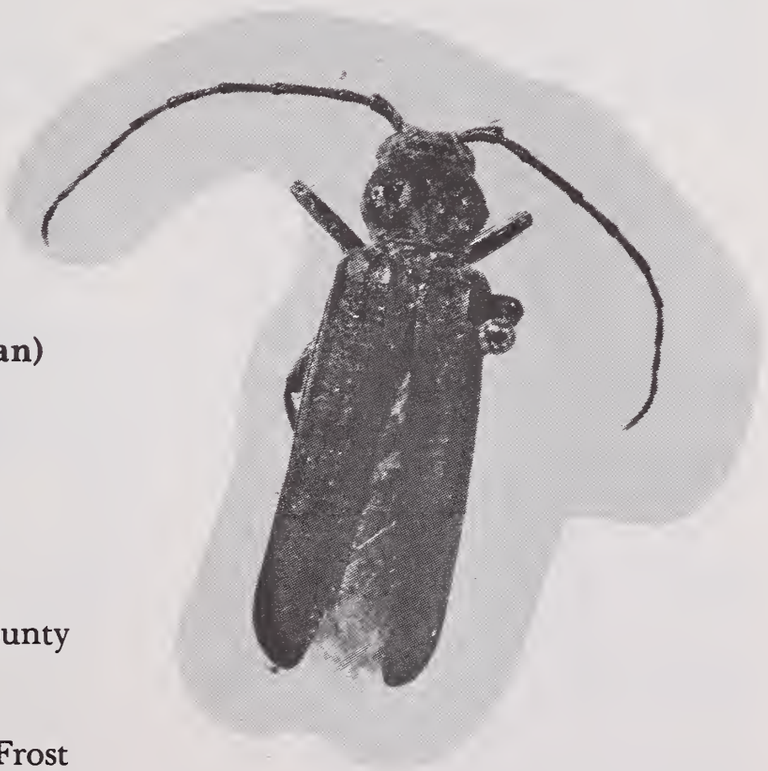
[Subfamily:Aseminae]

SIZE. 2.0 cm.

DISTRIBUTION. Bottineau County (fig. 1).

HOSTS. *Pinus* spp., *Picea* spp. (Frost 1915, Knull 1946).

COMMENTS. All adult specimens were taken in light traps from August 3 to 29. Larvae infest the root collar of dead pine and spruce trees (Frost 1915, Knull 1946). Gardiner (1970) successfully reared this species on artificial diet from the egg stage.



Astyleiopus variegatus (Haldeman)

[Subfamily:Lamiinae]

SIZE. 1.1 cm.

DISTRIBUTION. Barnes, Billings, Bottineau, Burleigh, Cass, Morton, and Ward Counties (fig. 1).

HOSTS. *Acer negundo* (Leng and Hamilton 1896); *Castanea dentata* (Beutenmuller 1896); *Parthenocissus inserta, Gleditsia triacanthos* (Champlain et al. 1925); *Toxicodendron radicans* (Dillon and Dillon 1961); *Populus deltoides, Caragana arborescens.*

COMMENTS. Recorded as breeding in dead branches of chestnut, Virginia creeper, honeylocust, and boxelder. Larvae found in live wood associated with old wounds of *P. deltoides* were removed and reared successfully on the McMorran spruce budworm diet. The larvae pupated on April 24 and adults emerged on May 30. Adults were collected by sweeping, Malaise trap, or using pyrethrum spray from May 31 to August 25. Craighead (1923) indicates that larvae will exclusively mine thick bark, between the bark and wood with thin bark, or in the wood of small decayed twigs. Pupation takes place in the bark or between the bark and wood in an oval cell of fibrous frass. Chittenden (1894) observed the ichneumon *Pimpla irritator* (Fabricius) as an external parasite on the larvae, and the larvae of an ostomatid beetle, *Tenebroides corticalis* Melsheimer, as a predator of the pupal stage.

Batyle ignicollis ignicollis (Say)

[Subfamily:Cerambycinae]

SIZE. 1.3 cm.

DISTRIBUTION. Billings, Golden Valley, and Slope Counties (fig. 2).

HOSTS. *Pinus* spp.

COMMENTS. Larvae recorded in dead pine branches (Knull 1946). Adults collected between July 21 and 27.

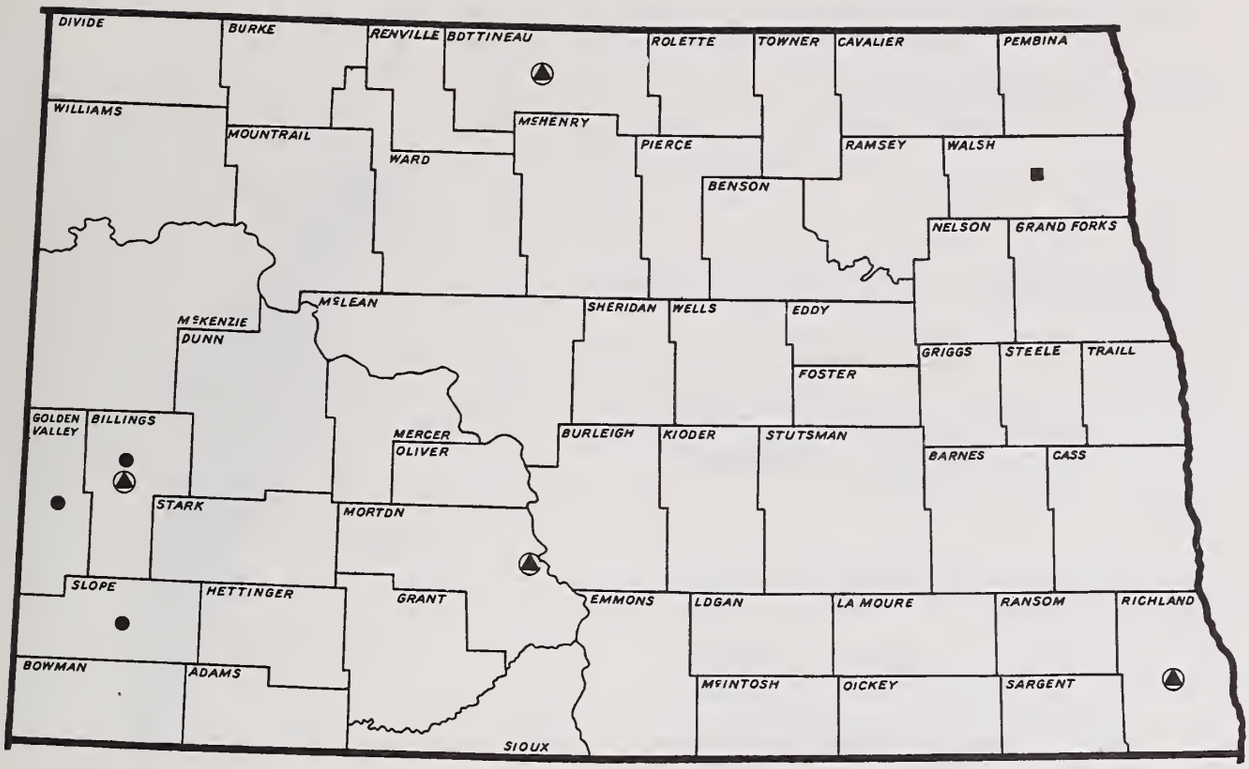


Figure 2.—Distribution of *Batyle ignicollis ignicollis* (●), *Batyle suturalis suturalis* (▲), and *Bellamira scalaris* (■).

Batyle suturalis suturalis (Say)

[Subfamily:Cerambycinae]

SIZE. 8.0 mm.

DISTRIBUTION. Bottineau, Billings, Morton, and Richland Counties (fig. 2).

HOSTS. *Carya* (Champlain et al. 1925); *Castanea dentata, Quercus* (Knull 1946).

COMMENTS. The larvae hollow out small dead twigs and pupate between two wads of fibrous chips (Craighead 1923). Adults are found on flowers of *Ceanothus, Spirea, Achillea, Chrysanthemum, Cornus,* and *Daucus carota* from June 25 to July 28.

Bellamira scalaris (Say)

[Subfamily:Lepturinae]

SIZE. 2.5 cm.

DISTRIBUTION. Walsh County (fig. 2).

HOSTS. *Betula lutea, Acer* (Beutenmuller 1896); *Fagus, Pinus, Populus, Tsuga* (Craighead 1923).

COMMENTS. One adult specimen collected on June 23. Beutenmuller (1896) records the adults ovipositing on maple, and both adult and pupae taken under bark of yellow birch (*Betula lutea).* According to Craighead (1923), "The larvae feed indiscriminately in almost all coniferous or hardwood trees provided the proper conditions of moisture and decay are present. They require well rotted logs in very moist situations. The mines are large and irregular, extend through the sapwood and heartwood, and are filled with loose, fibrous frass." The ichneumon *Arotes formosus* Cresson has been recorded as a parasite of this beetle (Linsley 1961).

Clytus ruricola (Olivier)

[Subfamily:Cerambycinae]

SIZE. 1.1 cm.

DISTRIBUTION. Cavalier and Richland Counties (fig. 3).

HOSTS. *Acer* spp., *Sorbus, Carya* spp., *Betula, Alnus rugosa, Ostrya virginiana, Fagus, Quercus, Tilia americana* (Blackman and Stage 1924).

COMMENTS. Infests decaying wood in association with a wood fungus (Craighead 1923). Adults found on flowers from June 16 to 27. Gardiner (1970) reported successful rearing of this species on artificial diet.

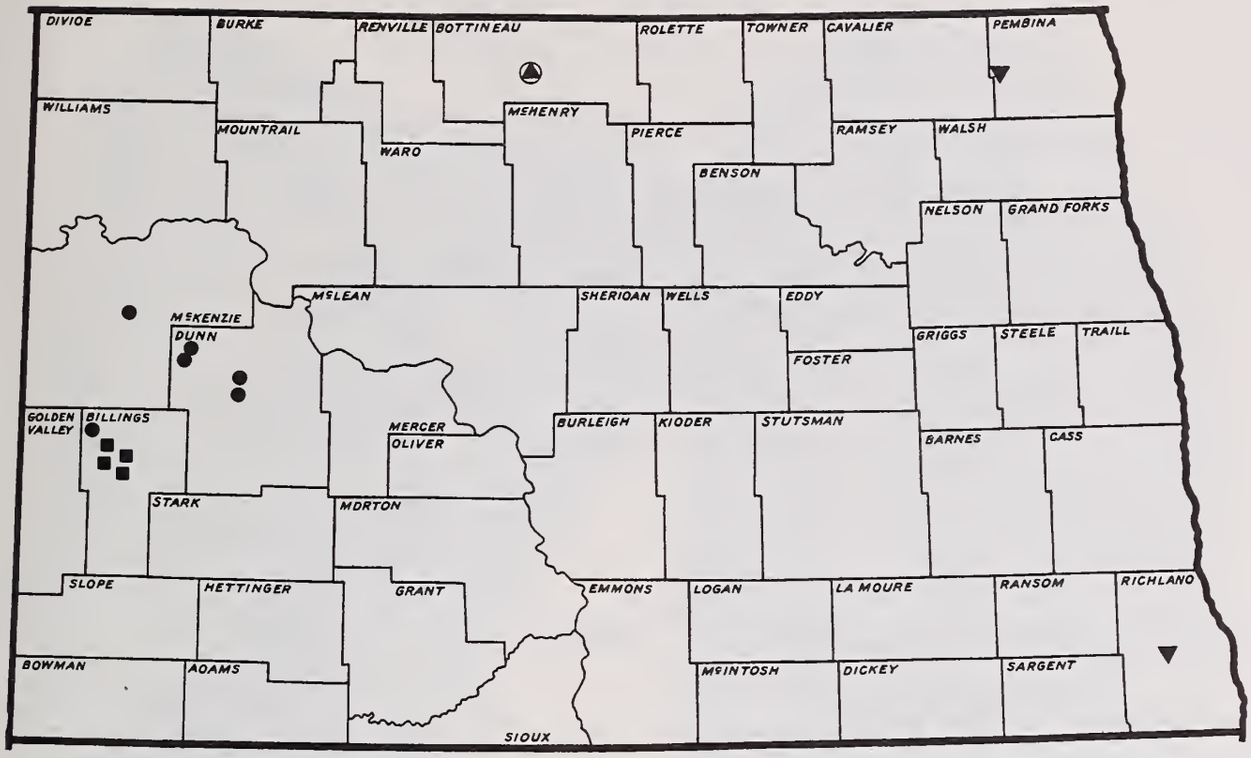
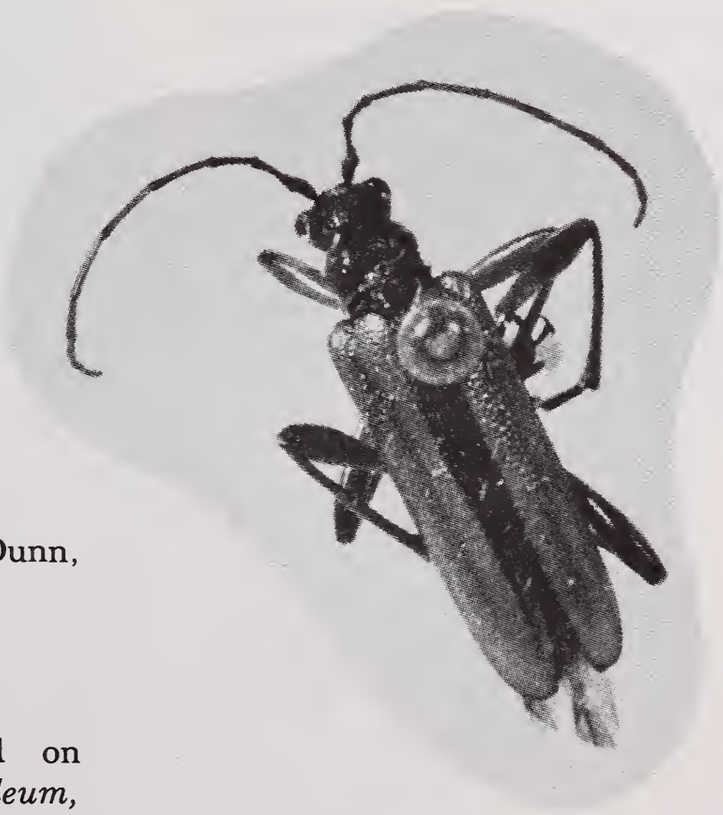


Figure 3.—Distribution of *Clytus ruricola* (▼), *Cortodera longicornis* (●), *Crossidius coralinus* (■), and *Crossidius pulchellus* (▲).



***Cortodera longicornis* (Kirby)**

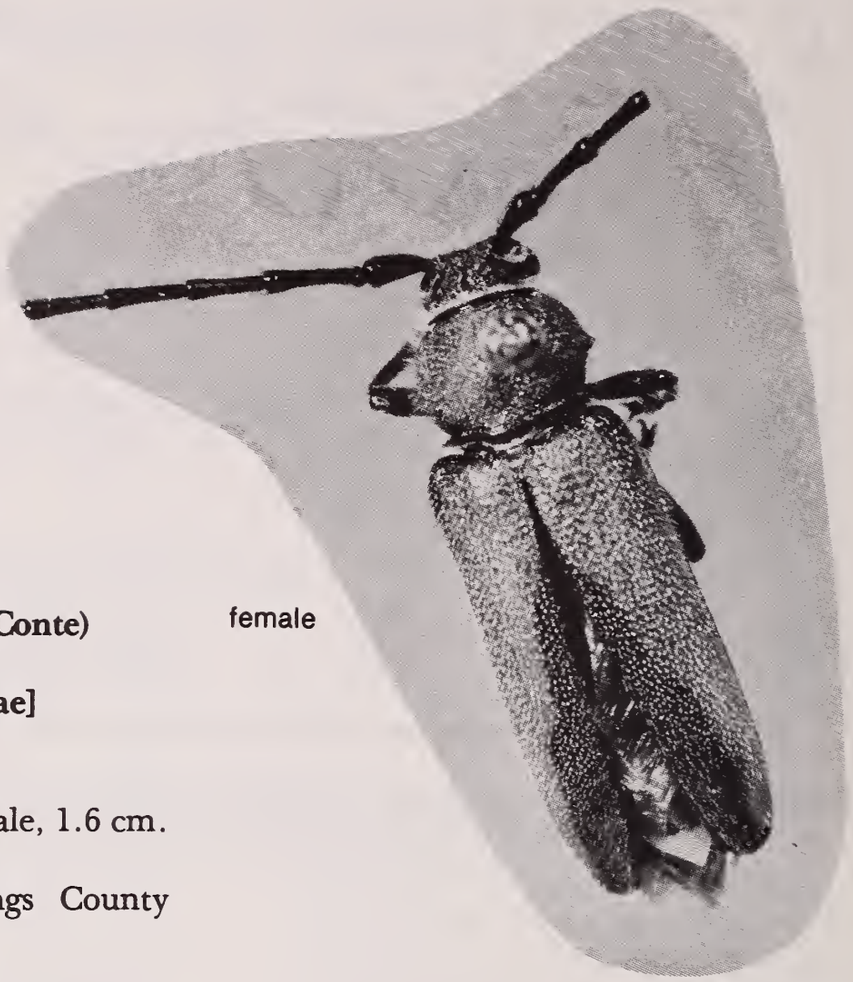
[Subfamily:Parandrinae]

SIZE. 9.0 mm.

DISTRIBUTION. Billings, Dunn, and McKenzie Counties (fig. 3).

HOSTS. Unknown.

COMMENTS. Adults found on flowers of *Balsamorhiza, Heracleum, Purshia, Rosa, Symphoricarpos, Potentilla,* and *Ceanothus* (Linsley and Chemsak 1972) from June 14 to July 9.



female

***Crossidius coralinus* (LeConte)**

[Subfamily:Cerambycinae]

SIZE. Female, 1.2 cm; male, 1.6 cm.

DISTRIBUTION. Billings County (fig. 3).

HOSTS. *Chrysothamnus nauseosus, Haplopappus* spp. (Linsley 1957, Linsley and Chemsak 1961).

COMMENTS. Linsley (1962b) states that this species is highly polytypic, consisting of a large number of subspecies and local populations. Adults collected on rabbitbrush west of the Missouri River from July 7 to August 30. Due to the small amount of material available for study, specimens were not placed in any of the described subspecies.

male

female

Crossidius pulchellus **(LeConte)**

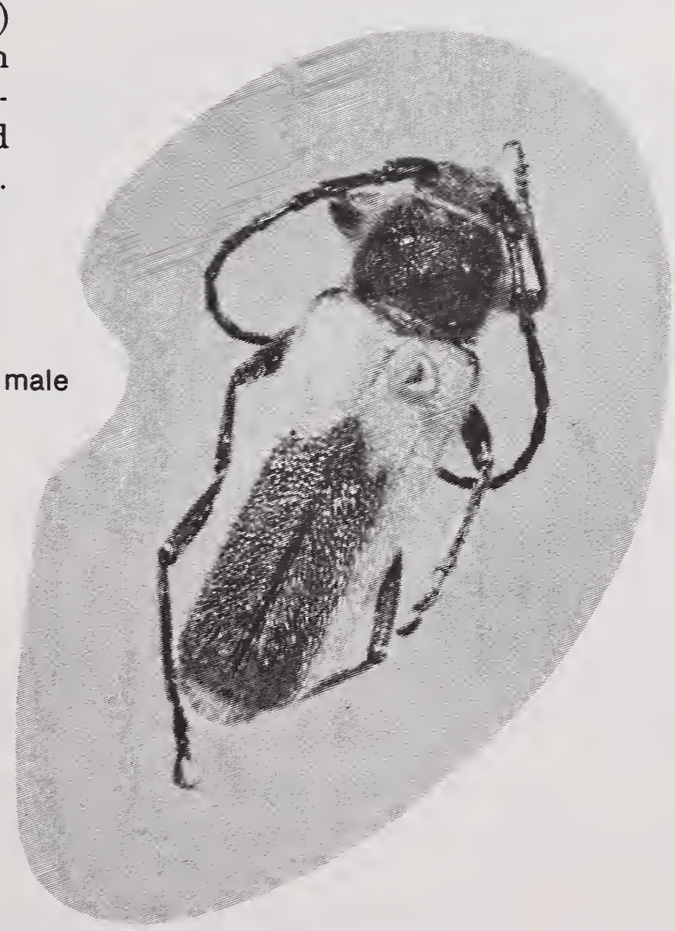
[Subfamily:Cerambycinae]

SIZE. Female, 1.3 cm; male, 1.2 cm.

DISTRIBUTION. Bottineau County (fig. 3).

HOSTS. *Gutierrezia* spp., *Haplopappus hartwegi* (Linsley and Chemsak 1961); *Artemisia* (Craighead 1923).

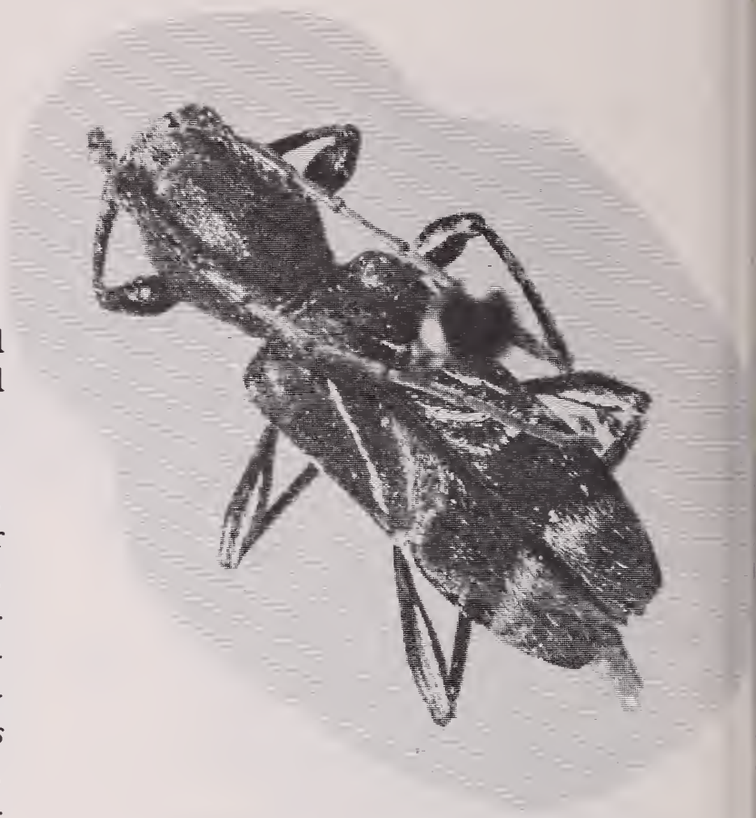
COMMENTS. Linsley (1955) states that larvae bore into roots of *Gutierrezia* spp., and Craighead (1923) indicates that larvae were found in roots of *Artemisia*. Adults were collected from flowers of broomweed (*Gutierrezia sarothrae)* on August 10.



male

Cyrtophorus verrucosus (Olivier)

[Subfamily:Cerambycinae]



SIZE. 1.2 cm.

DISTRIBUTION. Bottineau, Grand Forks, McHenry, Pembina, and Richland Counties (fig. 4).

HOSTS. *Carya glabra, Cydonia, Prunus pensylvanica* (Beutenmuller 1896); *Quercus* spp., *Cornus florida, Pyrus malus, Diospyros, Betula, Benzoin, Acer* (Craighead 1923); *Castanea, Fagus atropunicea, Tilia, Hicoria, Juglans nigra, Robinia, Vitis* (Duffy 1953); *Carpinus caroliniana, Cercis canadensis* (Knull 1946); *Liriodendron tulipifera, Ostrya virginiana* (Linsley 1964); *Pinus virginiana* (Perry 1975); *Prunus virginiana.*

COMMENTS. Known to have a life cycle of 1 year (Duffy 1953). According to Craighead (1923), the larvae feed in solid dead wood, and are often associated with *Neoclytus.* Overwintering adults were found in the base of a *Prunus virginiana* trunk, 13 mm below surface of the wood on March 30. Adult specimens have been collected with a pane trap, Malaise trap, and by sweeping flowers of dogwood, spirea, and goldenrod from May 28 to July 5.

According to Linsley (1961) the clerid *Cymatodera bicolor* (Say) is a predator of this wood borer.

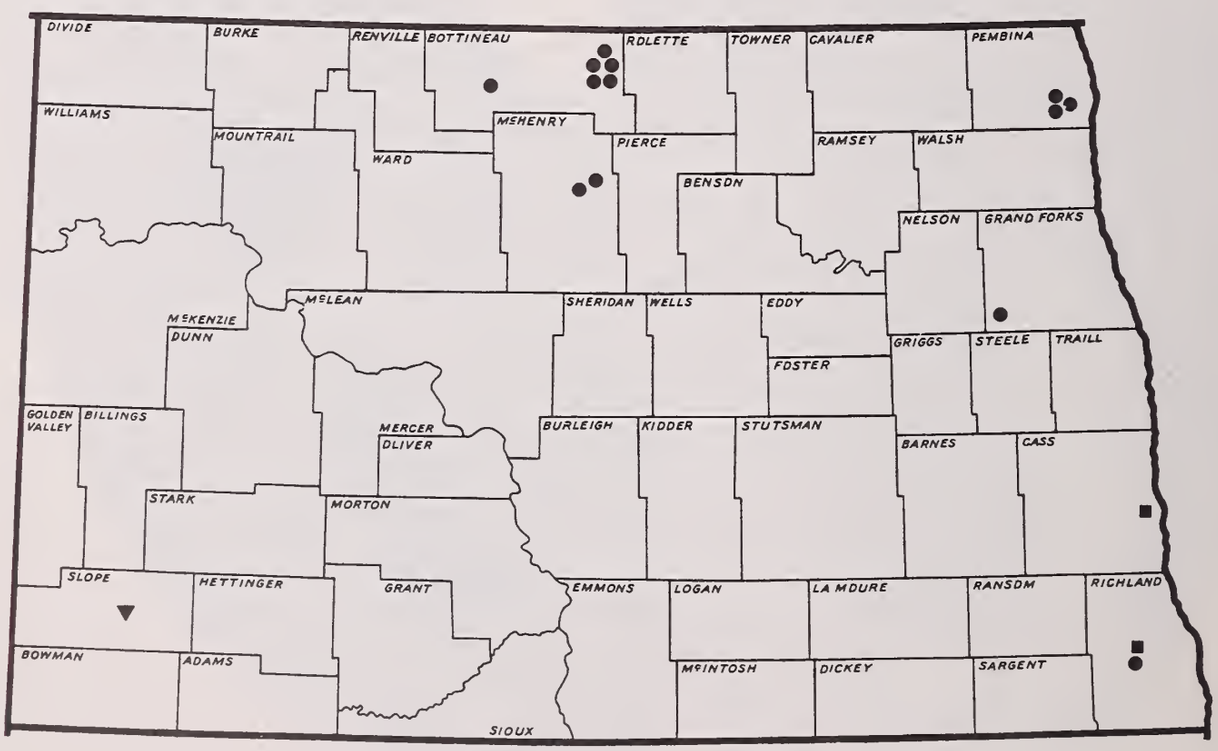


Figure 4.—Distribution of *Cyrtophorus verrucosus* (●), *Dectes texanus texanus* (▼), and *Elaphidion mucronatum* (■).

Dectes texanus texanus **LeConte**

[Subfamily:Lamiinae]

SIZE. 7.0 mm.

DISTRIBUTION. Slope, Golden Valley, Hettinger, and Barnes Counties (fig. 4).

HOSTS. *Ambrosia artemisifolia* (Leng and Hamilton 1896); *Xanthium* spp., soybeans (Patrick 1971, 1973).

COMMENTS. Adults were collected in North Dakota on July 13 and 21. Leng and Hamilton (1896) state that this species breeds in stems of ragweed, especially *Ambrosia artemisifolia*. According to Patrick (1971, 1973), this beetle infests cocklebur in Tennessee, ragweed in Missouri, and soybean in Arkansas, Louisiana, Missouri, and Tennessee. Patrick also reported that eggs deposited in the stem pith had an incubation period of 6 to 10 days. The larvae passed through four instars, mining up and down the stem. During the fourth stadium the larvae girdle the stem, construct a pupal chamber, and plug the exit hole with frass before overwintering. Pupation occurred the following May, and the adults emerged in June.

Elaphidion mucronatum **(Say)—Spined bark borer**

[Subfamily:Cerambycinae]

SIZE. 1.6 cm.

DISTRIBUTION. Cass and Richland Counties (fig. 4).

HOSTS. *Quercus, Acer, Celtis, Cercis, Cornus, Juglans, Fagus, Chamaerops, Rhus, Morus, Castanea, Populus, Liriodendron, Asimina, Pyrus, Malus, Myrica, Sassafras* (Linsley 1963); *Sabal, Vitis* (Beutenmuller 1896); *Tilia, Taxodium* (Duffy 1953).

COMMENTS. Adults were collected during mid-July. Eggs are laid beneath bark scales of dead branches. Larvae feed under the bark the first summer, and enter the sapwood to construct a long pupal chamber sealed with a fibrous plug the second year (Craighead 1950).

Elaphidionoides incertus
(Newman)

[Subfamily:Cerambycinae]

SIZE. 1.6 cm.

DISTRIBUTION. Richland County (fig. 5).

HOSTS. *Morus rubra, Quercus, Carya* (Blackman and Stage 1924, Linsley 1963).

COMMENTS. Adults were collected on August 1. Blatchley (1910) reported the adult flight period extends from late June to late September in Indiana. According to Craighead (1950), the larvae feed in the outer bark of living mulberry trees. However, Blackman and Stage (1924) observed that this beetle attacks the trunk region of dead or dying hickory. They reported the life history was 2 years in material infested while dying, and 3 years when the wood was dead a year or more before being infested.

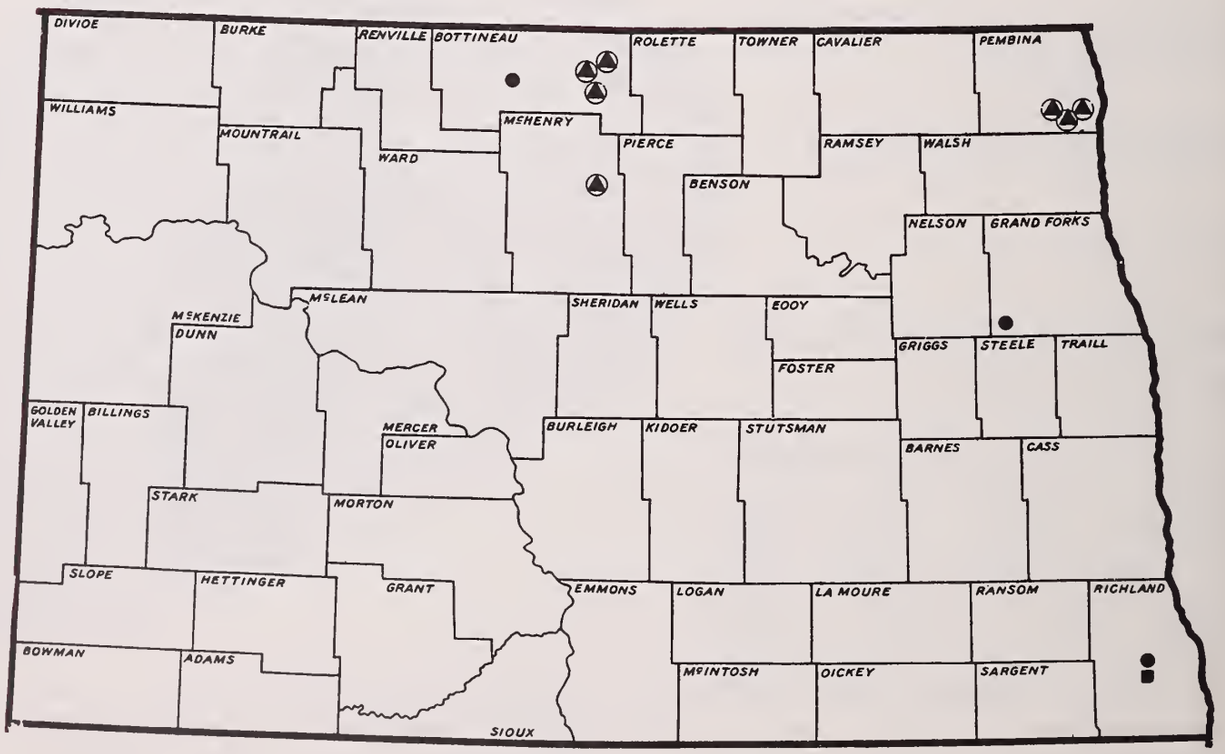


Figure 5.—Distribution of *Elaphidionoides incertus* (■), *Elaphidionoides parallelus* (●), and *Elaphidionoides villosus* (▲)

Elaphidionoides parallelus **(Newman)**

[Subfamily:Cerambycinae]

SIZE. 1.3 cm.

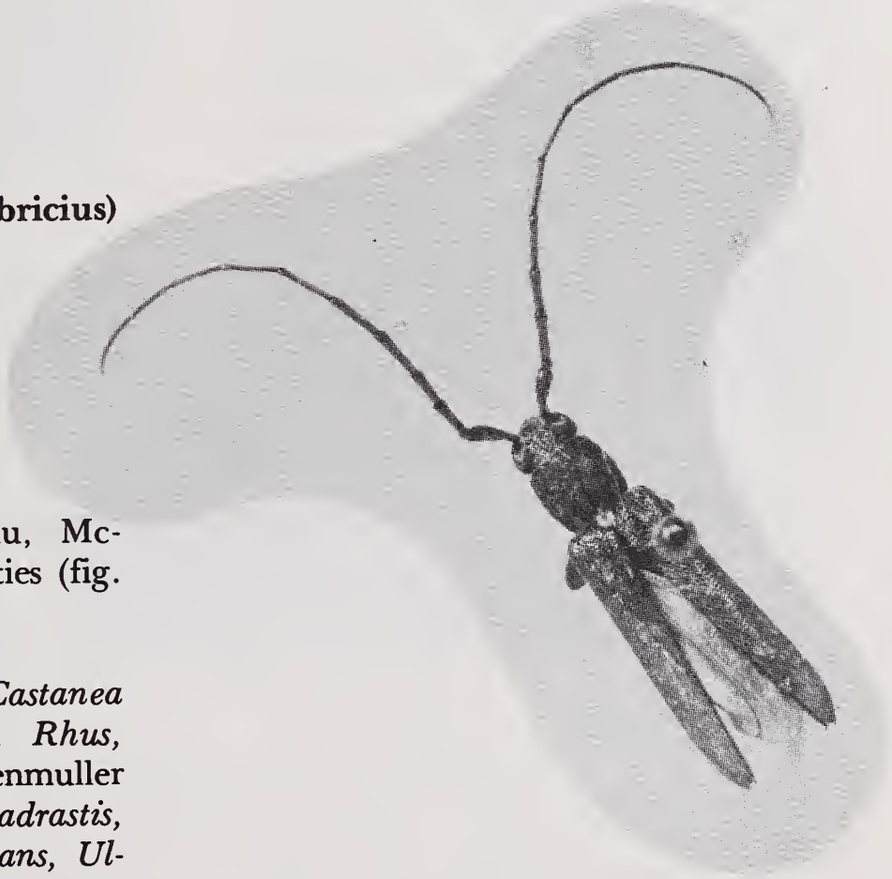
DISTRIBUTION. Bottineau, Grand Forks, and Richland Counties (fig. 5).

HOSTS. *Quercus, Carya, Prunus, Malus, Vitis* (Beutenmuller 1896); *Juglans* (Linsley 1963).

COMMENTS. Adults were collected from June 17 to July 2. The biological habits of the larvae are similar to those of *E. villosus*.

Elaphidionoides villosus **(Fabricius) —Twig pruner**

[Subfamily:Cerambycinae]



SIZE. 1.1 cm.

DISTRIBUTION. Bottineau, McHenry, and Pembina Counties (fig. 5).

HOSTS. *Quercus, Carya, Castanea dentata, Carpinus, Betula, Rhus, Prunus, Malus, Vitis* (Beutenmuller 1896); *Tilia, Wisteria, Cladrastis, Gleditsia, Celtis, Acer, Juglans, Ulmus, Cercis canadensis, Citrus, Maclura aurantiaca, Celastrus scandens, Hamamelis, Sassafras* (Linsley 1963); *Pinus virginiana* (Perry 1975).

COMMENTS. Adults taken in Malaise trap from June 27 to July 17. Eggs are laid in the axils of leaves near the twig tip. The larvae mine down the twig, and in late summer sever the branch by several cuts from the center outward, leaving the bark intact. The larvae retreat up the twig and pupate between two fibrous wads of frass the following spring or fall. The twigs are usually broken off the tree by wind (Blackman and Ellis 1916, Craighead 1950, Kotinsky 1921). Known parasites are *Odontobracon elaphidiovorus* Rohwer and *Bracon eurygaster* (Brulle) (Linsley 1963). Linsley (1961) also reported the clerid *Phylogistostermus dislocatus* (Say) as a predator of *E. villosus*.

Enaphalodes cortiphagus (Craighead)—Oak-bark scarrer

[Subfamily:Cerambycinae]

SIZE. 2.2 cm.

DISTRIBUTION. Grand Forks County (fig. 6).

HOSTS. *Quercus* spp.

COMMENTS. Adults were collected on August 22. According to Craighead (1950), adults appear while the chestnut is in full bloom, or a little later, and deposit eggs in bark crevices. Larvae feed at first in thick bark ridges, going deeper as they increase in size. The mines are tightly packed with granular frass. After 3 or more years they burrow deep into the inner bark, where a large excavation is made for the pupal cell. This cell usually injures the cambium, resulting in a large black defect, which defaces many annual layers of growth and causes the formation of the characteristic scar on the outer bark surface.

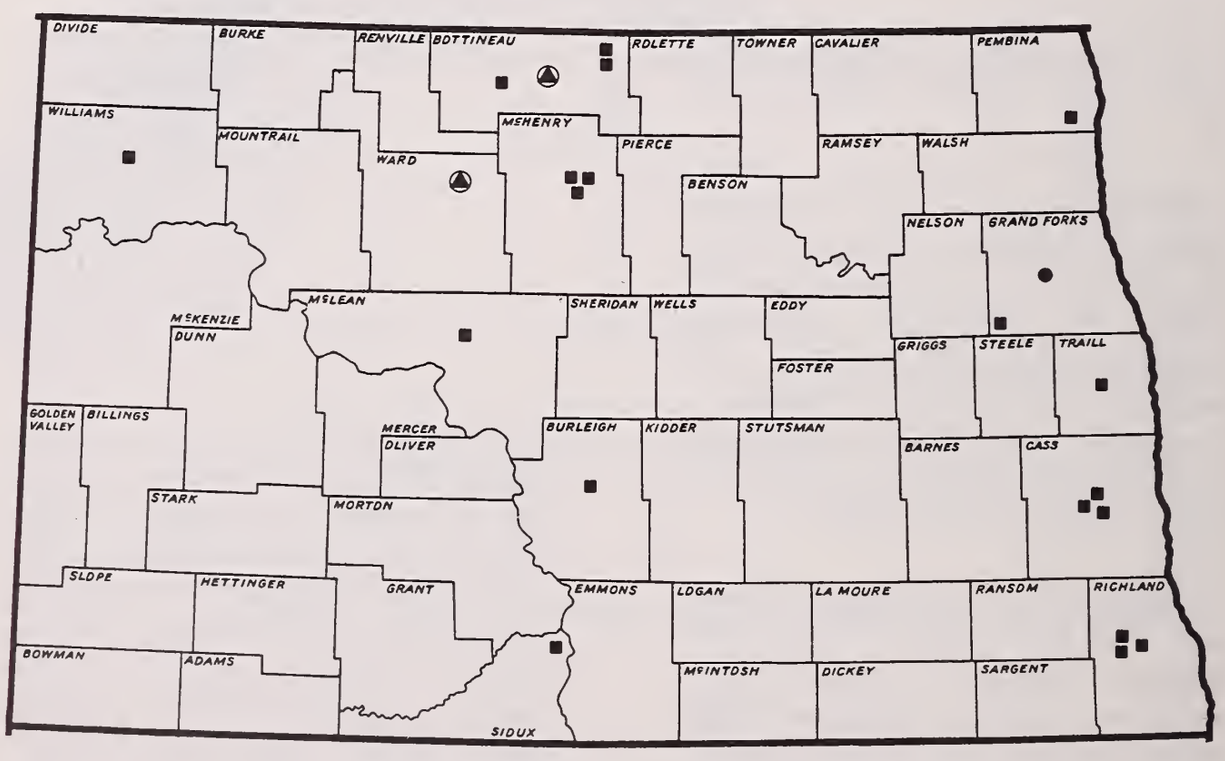
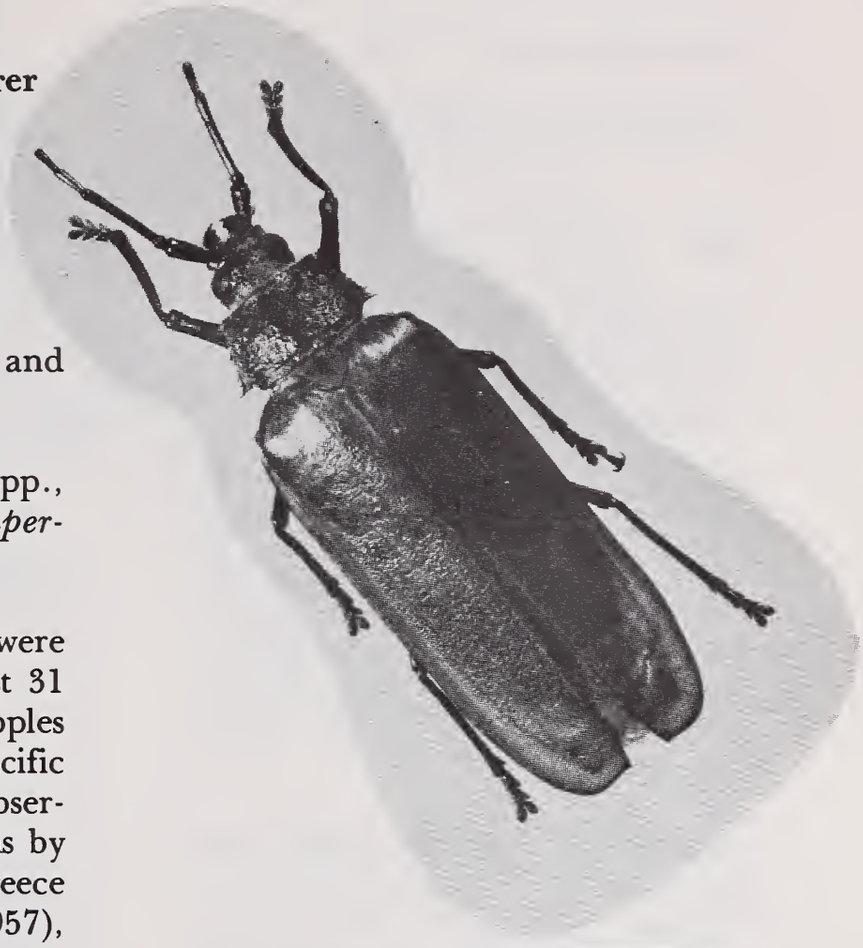


Figure 6.—Distribution of *Enaphalodes cortiphagus* (●), *Ergates spiculatus spiculatus* (▲), and *Eutetrapha tridentata* (■).

***Ergates spiculatus spiculatus* (LeConte)—Ponderosa pine-borer**

[Subfamily:Parandrinae]



SIZE. 5.5 cm.

DISTRIBUTION. Bottineau and Ward Counties (fig. 6).

HOSTS. *Pinus* spp., *Abies* spp., *Pseudotsuga* spp., *Sequoia sempervirens* (Linsley 1962a).

COMMENTS. Adult specimens were captured on July 21 and August 31 in association with California apples and lumber shipped from the Pacific Northwest. Detailed biological observations are found in publications by Craighead (1915), Hardy and Preece (1926), Spencer and Buckell (1957), Schoening and Tilden (1959), and Tyson (1966).

***Eutetrapha* (= Saperda) *tridentata* (Olivier)—Elm borer**

[Subfamily:Cerambycinae]

SIZE. 1.2 cm.

DISTRIBUTION. Bottineau, Burleigh, Cass, Grand Forks, Richland, Sioux, Traill, McHenry, Pembina, and Ransom Counties (fig. 6).

HOSTS. *Ulmus* spp., *Acer* (Leng and Hamilton 1896); *Ulmus americana.*

COMMENTS. Adults were collected from June 4 to August 13. According to Kotinsky (1921) and Pechuman (1940) the adults attack freshly cut logs or dead and weakened trees. The larvae tunnel beneath the bark, filling their mines with fibrous frass, and destroying the phloem and cambium. Pupal cells are constructed in the heartwood. Baker (1972) states that the life cycle is usually 1 year, although 3 years may be needed in dry wood. Adults have been reared from American elm trap logs cut for bark beetles or captured in a Malaise trap. The parasites *Eubadizon* sp., *Cenocoelium* sp., and *Trigonura elegans* (Provancher) emerged from elm logs containing *E. tridentata* along with other species of beetles in North Dakota. According to Linsley (1961) *Cenocoelius saperdae* (Ashmead), *Atanycolus simplex* (Cresson), *A. ulmicola* (Viereck), and *Xorides albopictus* (Cresson) are also parasites of the elm borer.

Hyperplatys aspersus Say

[Subfamily:Lamiinae]

SIZE. 3.0 mm.

DISTRIBUTION. Bottineau, Golden Valley, Grand Forks, Pembina, and Richland Counties (fig. 7).

HOSTS. *Populus* spp., *Carya, Castanea dentata* (Beutenmuller 1896); *Malus* (Leng and Hamilton 1896); *Amelanchier alnifolia* (Knull 1946); *Rhus* (Dillon 1956); *Prunus pensylvanica* (Bird 1927); *Ulmus pumila, Fraxinus pennsylvanica, Prunus americana, Salix.*

COMMENTS. Found throughout the eastern half of the United States and Canada, this species has been recorded as breeding in dead twigs. In North Dakota the adults fly between June 11 and July 25, and are frequently found on Siberian elm. Larvae were collected in April and reared from infested green ash and American plum growing under stress conditions. Larvae were associated with *Neoclytus acuminatus* in green ash. This species has also been reared from *Cornus* (Tyson, W. H. 1976, Calif. State Dep. Agric., Fresno, Calif., personal communication). The ichneumon parasite *Xorides humeralis humeralis* (Say) was reared from larval specimens in American plum. Muesebeck et al. (1951) recorded the bracon *Cenocolius provancheri* (Rohwer) as a parasite. *Meteorus tibialis* Muesebeck has been reported as a larval parasite in Canada (Gardiner 1961b). According to Gardiner (1970) *H. aspersus* was successfully reared on artificial diet.

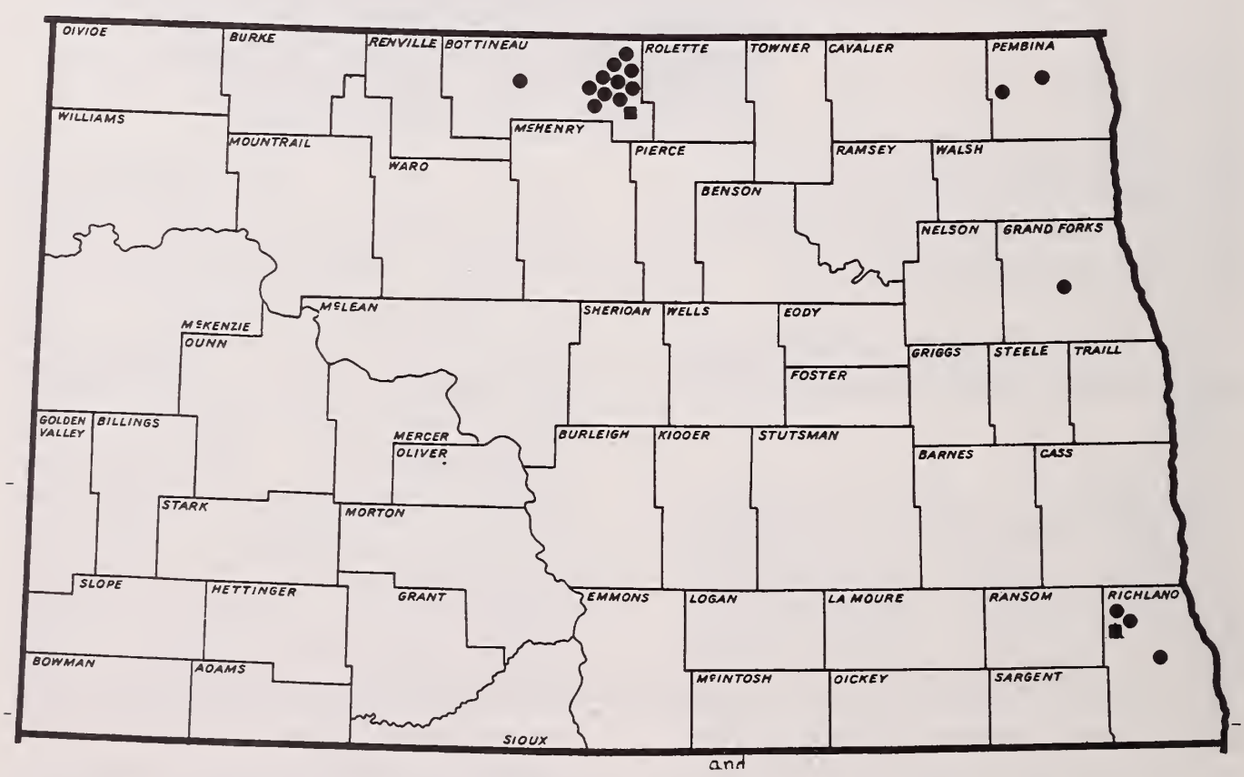


Figure 7.—Distribution of *Hyperplatys aspersus* (●) and *Hyperplatys maculata* (■).

Hyperplatys maculata **Haldeman**

[Subfamily:Lamiinae]

SIZE. 4.0 mm.

DISTRIBUTION. Bottineau and Richland Counties (fig. 7).

HOSTS. *Populus* spp., *Malus, Carya* (Beutenmuller 1896); *Pinus, Picea, Pseudotsuga* (Craighead 1923); *Salix* spp. (Dillon and Dillon 1961); *Quercus rubra, Juglans cinerea, Tilia americana* (Gardiner 1961b); *Acer negundo, Ulmus pumila.*

COMMENTS. Adults were collected from boxelder and Siberian elm on June 12 and July 24. Beutenmuller (1896) and Dillon and Dillon (1961) record the larvae as infesting dead twigs or branches. According to Craighead (1923) the larvae have been reared from pine, spruce, and fir in Colorado and Oregon. Chemsak and Linsley (1975) list *H. nigrella* as a synonym of *H. maculata.*

Mecas inornata **(Say)**

[Subfamily:Lamiinae]

SIZE. 8.0 mm.

DISTRIBUTION. Dunn, Ransom, and Sioux Counties (fig. 8).

HOSTS. *Salix* spp., *Populus* (Beutenmuller 1896); *Helenium tenuifolium, H. tuberosus* (Leng and Hamilton 1896).

COMMENTS. Adults were collected from June 22 to July 13. Although most literature states that this species breeds in roots and stems of shrubs, herbs, or weeds (Riley 1880), Beutenmuller (1896) reports the larvae as living in shoots of willow and poplar.

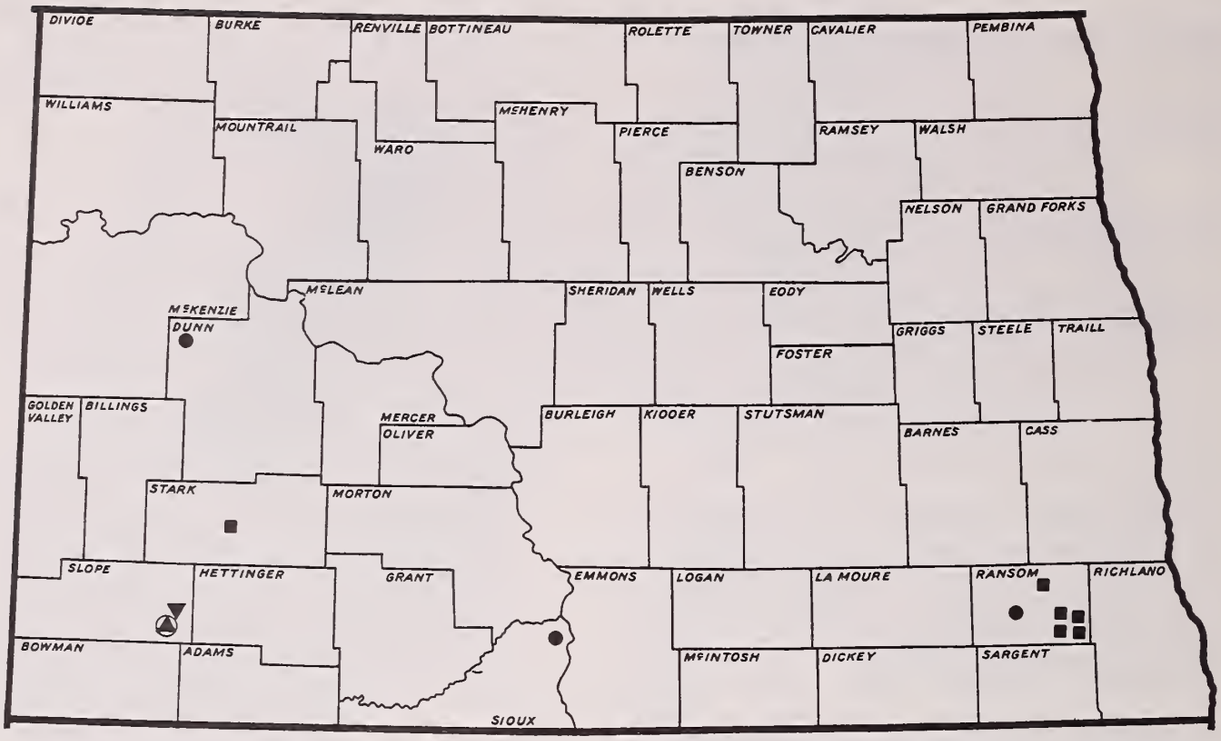


Figure 8.—Distribution of *Mecas inornata* (●), *Megacyllene angulifera* (▲), *Megacyllene powersi* (■), and *Moneilema annulatum* (▼).

Megacyllene angulifera (Casey)

[Subfamily:Cerambycinae]

SIZE. 1.3 cm.

DISTRIBUTION. Slope County (fig. 8).

HOSTS. *Maclura pomifera, Malus, Quercus* (Riley 1880).

COMMENTS. Adults were collected on August 24. According to Linsley (1964), adults frequent goldenrod blossoms in the fall.

Megacyllene powersi **Linsley and Chemsak**

[Subfamily:Cerambycinae]

SIZE. 1.0 cm.

DISTRIBUTION. Ransom and Stark Counties (fig. 8).

HOSTS. Unknown.

COMMENTS. Adults were collected from June 25 to September 3. The type locality for this species is located 7 miles southeast of Sheldon, Ransom County, North Dakota (Linsley 1964).

Moneilema annulatum **(Say)**

[Subfamily:Lamiinae]

SIZE. 2.0 cm.

DISTRIBUTION. Slope County (fig. 8).

HOSTS. Cactaceae.

COMMENTS. Adults collected on July 1. Duffy (1953) states that the larvae infest cactus. *Opuntia polycantha* is the probable host in North Dakota.

Monochamus clamator clamator **LeConte —Spotted pine sawyer**

[Subfamily: Lamiinae]

SIZE. 2.1 cm.

DISTRIBUTION. Slope County (fig. 9).

HOSTS. *Pinus* spp.

COMMENTS. Adults collected August 10. According to Dillon and Dillon (1941), this species breeds in dead and dying *Pinus ponderosa, P. strobiformis, P. edulis,* and *P. arizonica.*

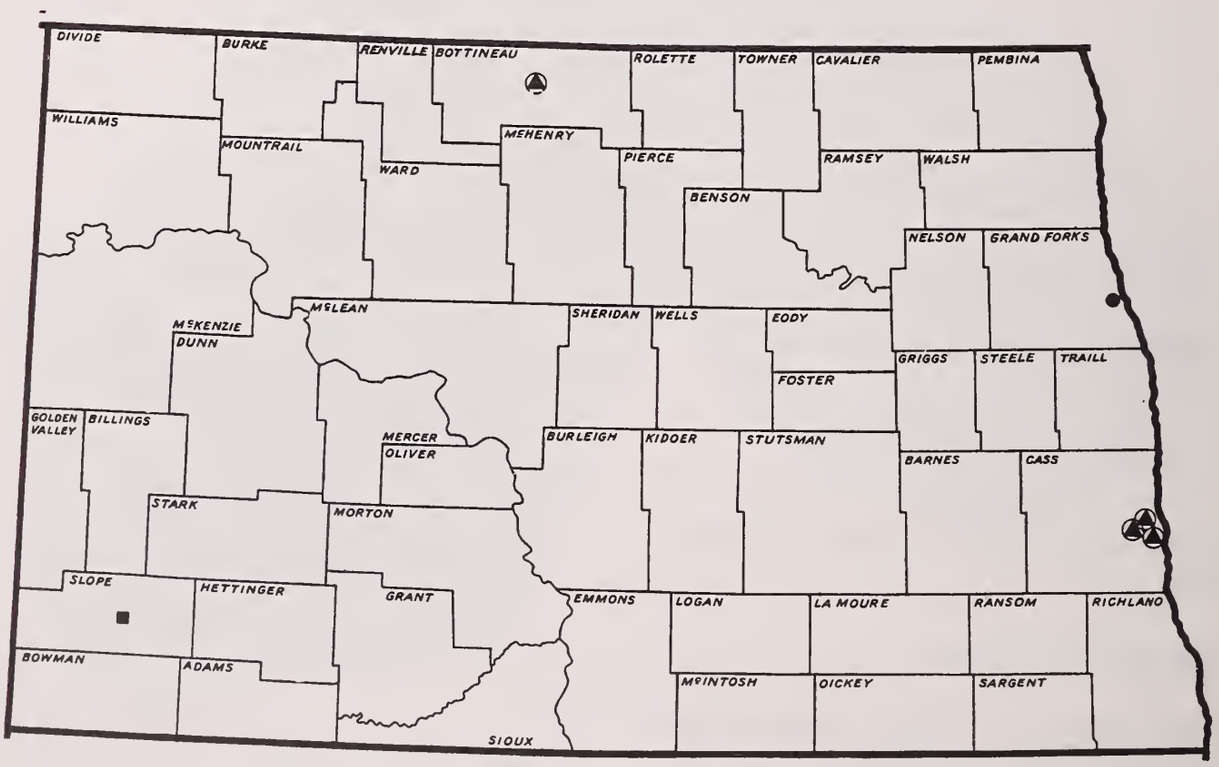
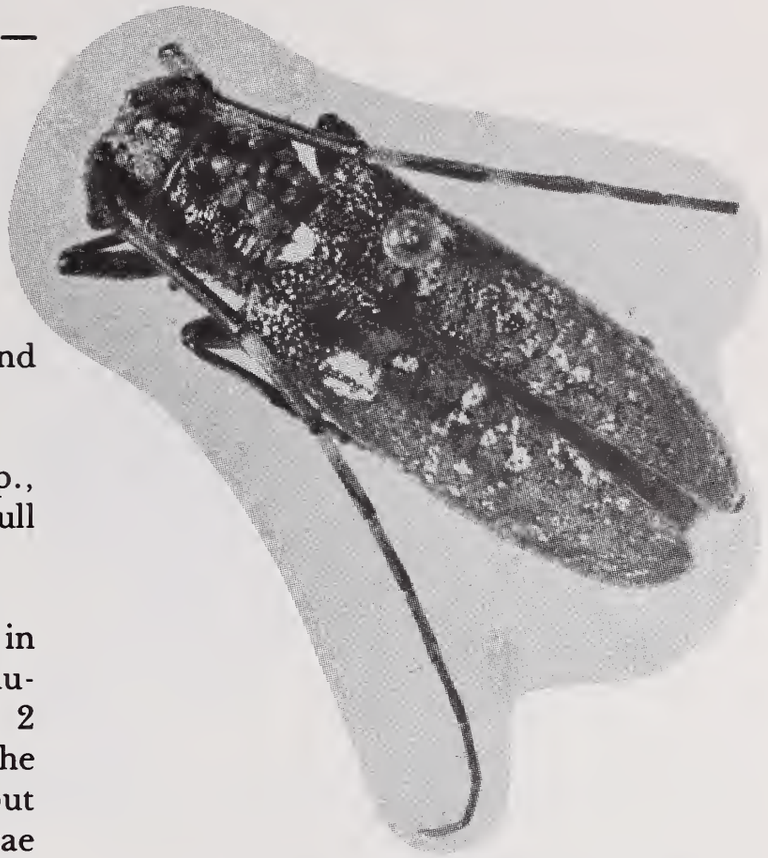


Figure 9.—Distribution of *Monochamus clamator clamator* (■), *Monochamus scutellatus* (▲), and *Monochamus titillator* (●).

Monochamus scutellatus **(Say)—White-spotted sawyer**

[Subfamily:Lamiinae]



SIZE. 1.6 cm.

DISTRIBUTION. Bottineau and Cass Counties (fig. 9).

HOSTS. *Pinus* spp., *Picea* spp., *Abies balsamea, Larix laricina* (Knull 1946, Wilson 1962).

COMMENTS. Adults emerge in North Dakota from May 21 to August 10. Rose (1957) states that 2 years are required to complete the life cycle in its northern range, but only 1 year further south. The larvae excavate a U-shaped tunnel and constructs a pupal cell plugged with excelsiorlike frass near the wood surface. Adults emerge and feed on needles and tender bark of various conifers. Eggs are deposited on freshly cut, dead, or dying trees. According to Wilson (1962), parasitic flies (*Eutheresia* spp.) and the hymenoptera parasites *Rhyssa lineolata* (Kirby) and *R. persuasoria* (Linnaeus) have been reared from *M. scutellatus* larvae. This species has been successfully reared from the egg stage on a modified McMorran budworm diet (Gardiner 1970).

Monochamus titillator **(Fabricius)—Southern pine sawyer**

[Subfamily:Lamiinae]

SIZE. 1.7 cm.

DISTRIBUTION. Grand Forks County (fig. 9).

HOSTS. *Pinus strobus, P. palustris, Abies balsamea* (Dillon and Dillon 1941).

COMMENTS. Adult collected on June 24. According to Anderson (1947), the adults lay eggs in bark of recently killed or dying trees. Eggs hatch within 5 days, and larvae tunnel into the cambium to feed. The pupal chamber is constructed in the sapwood much the same as by *M. scutellatus*. Webb (1909) states that there are at least two generations per year in the South. Gerberg (1951) has reported that adult beetles chewed large holes in a rayon dress. Muesebeck et al. (1951) lists the ichneumonids *Rhyssa lineolata* (Kirby) and *Rhyssa persuasoria* (Linnaeus) as parasitic on *M. titillator*.

***Neoclytus acuminatus acuminatus* (Fabricius)—Red-headed ash borer**

[Subfamily:Cerambycinae]

SIZE. 9.0 mm.

DISTRIBUTION. Bottineau, Bowman, Foster, Pembina, and Richland Counties (fig. 10).

HOSTS. *Vitis* (Knull 1946); *Carya, Fraxinus, Quercus* spp., *Juglans, Betula, Fagus, Ostrya virginiana, Acer* spp., *Celtis, Cornus florida, Cercocarpus, Ilex, Cercis canadensis, Diospyros virginiana, Syringa, Gleditsia, Lonicera, Prunus* spp., *Sassafras, Robinia pseudoacacia, Liriodendron tulipifera, Castanea, Persica vulgaris, Pyrus, Maclura pomifera* (Blackman and Stage 1924, Linsley 1964); *Malus, Campsis* (Barr and Manis 1954); *Ulmus americana, Fraxinus pennsylvanica.*

COMMENTS. Adults collected April 8 to July 15 by sweeping or in a Malaise trap. Craighead (1950) reported the larvae infesting nearly all dead and dying hardwoods, especially ash, oak, hickory, persimmon, and hackberry. Adults become active in the South during February, and May or June in the North. Eggs are deposited under the bark; larvae feed in the cambial region before they tunnel into the sapwood. The galleries become tightly packed with granular frass. Craighead indicated that the eggs are laid only in unseasoned wood of dead or dying trees. However, Barr and Manis (1954) reported attacks on healthy black locust.

Bromley (1934) recorded *Promachus bastardi* (Macquart) (Diptera: Asilidae) as a predator of this beetle. The following parasites have been reared from *N. acuminatus: Helconidera ferruginea* (Brues), *Helconidera ligator* (Say), *Coeloides scolytivorus* (Cresson), *Xoridea albopictus* (Cresson) (Linsley 1964); *Xorides humeralis humeralis* (Say) (Krombein and Burks 1967). Galford (1969) successfully reared this cerambycid from the egg stage on artificial diet.

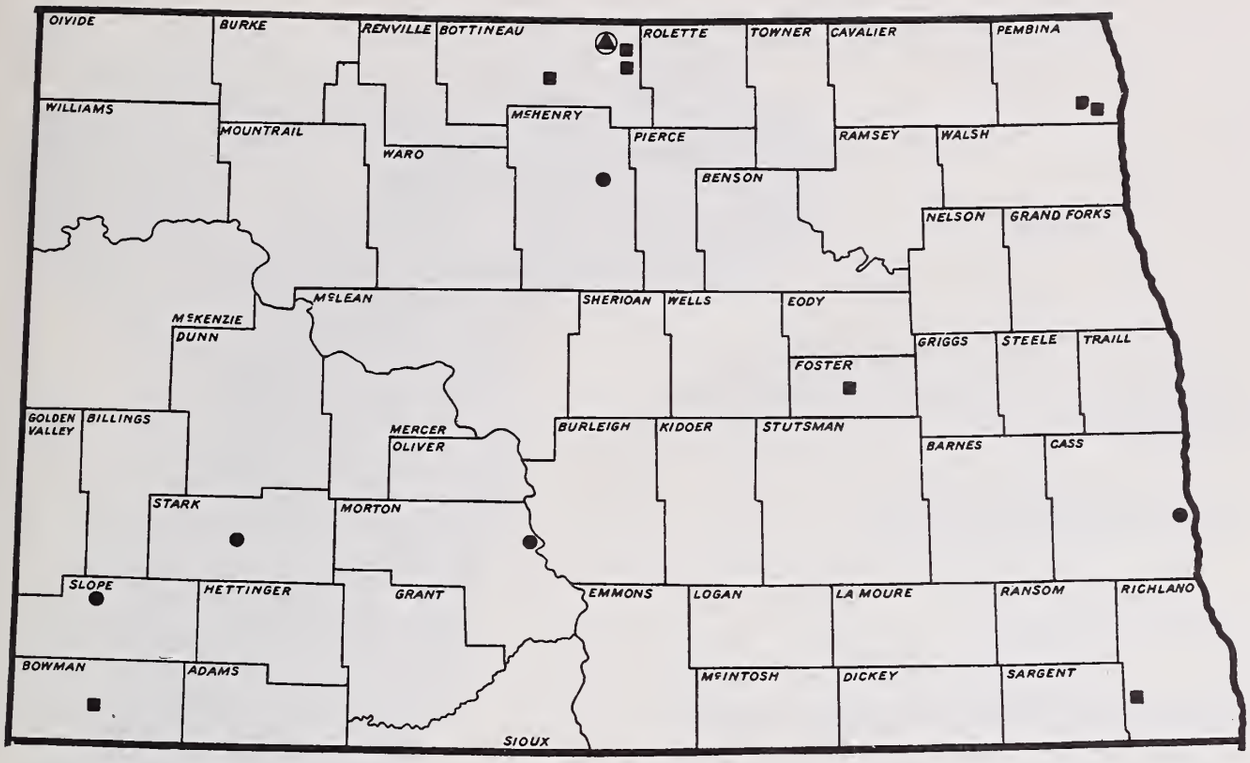


Figure 10.—Distribution of *Neoclytus acuminatus acuminatus* (■), *Neoclytus muricatulus muricatulus* (●), and *Nivellia mutabilis* (▲).

***Neoclytus muricatulus muricatulus* (Kirby)**

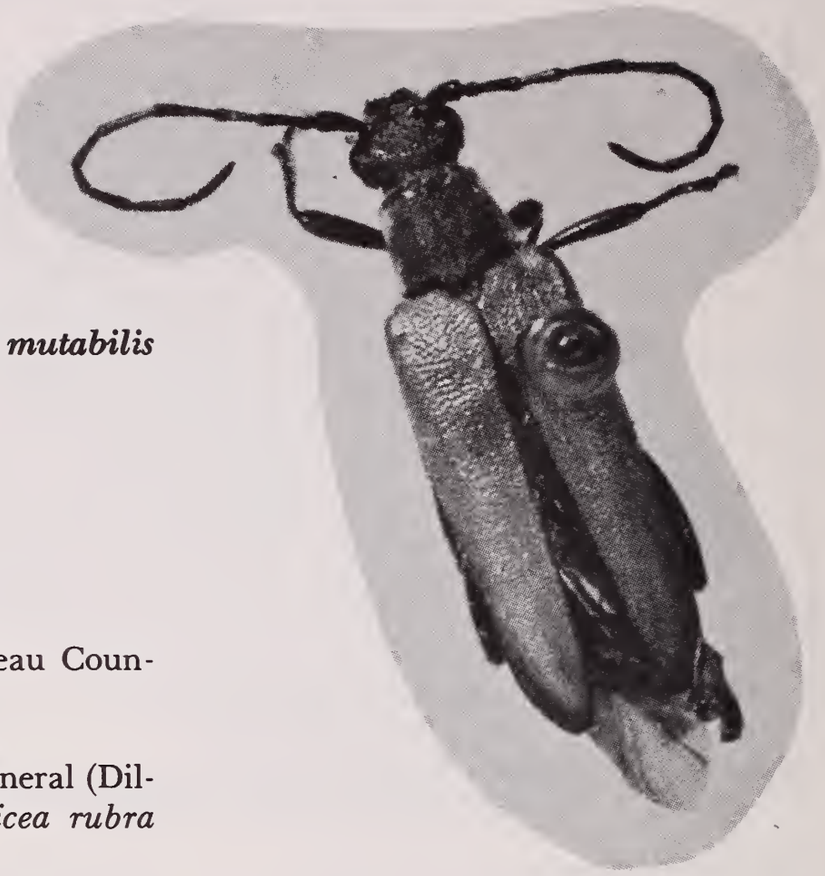
[Subfamily:Cerambycinae]

SIZE. 1.0 cm.

DISTRIBUTION. Cass, McHenry, Morton, Slope, and Stark Counties (fig. 10).

HOSTS. *Picea* spp., *Larix* spp. (Linsley 1964); *Pinus ponderosa*.

COMMENTS. Adults collected from June 8 to July 6. This species appears to attack seasoned wood with the bark still attached. Ponderosa pine cut in 1968 was caged in June of 1970, and adults emerged in late February 1971 without a cold treatment. Larval habits are similar to those of *N. acuminatus*. *Helcon pedalis* Cresson is recorded as a hymenopterous parasite of this species (Muesebeck et al. 1951). Gardiner (1970) has reported the successful rearing of this wood borer on artificial diet.



Nivellia **(= Anoplodera)** ***mutabilis*** **(Newman)**

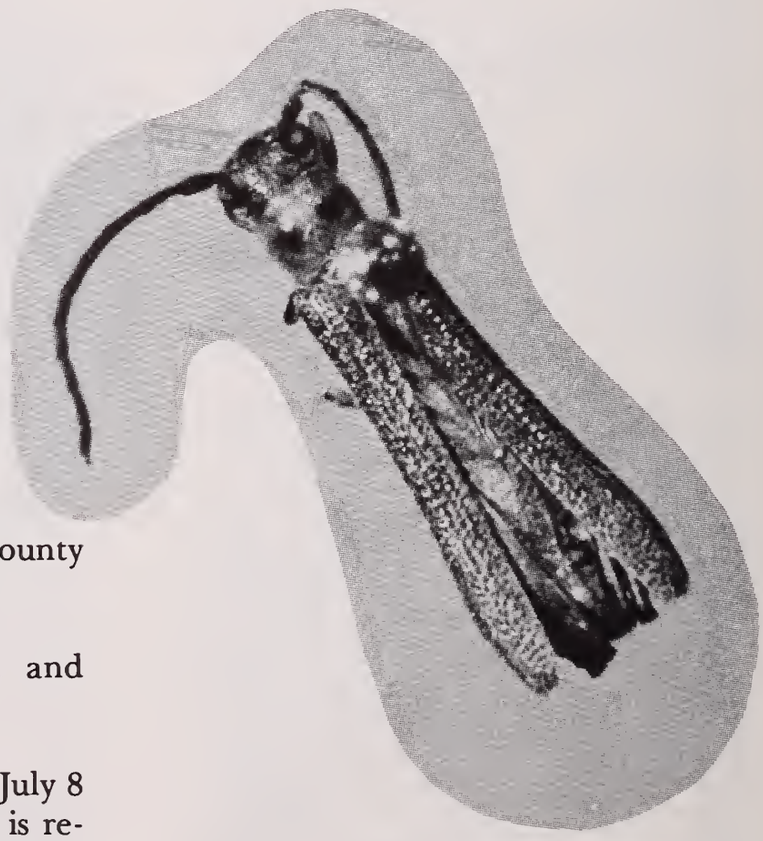
[Subfamily: Lepturinae]

SIZE. 9.0 mm.

DISTRIBUTION. Bottineau County (fig. 10).

HOSTS. Hardwoods in general (Dillon and Dillon 1961); *Picea rubra* (Baker 1972).

COMMENTS. Adult collected on high bush cranberry (*Viburnum trilobum)* June 26. Adults are often found on flowers, and the larvae are known to infest decaying hardwoods (Dillon and Dillon 1961).



Oberea basalis **LeConte**

[Subfamily: Lamiinae]

SIZE. 8.0 mm.

DISTRIBUTION. Bottineau County (fig. 11).

HOSTS. *Rubus* spp. (Dillon and Dillon 1961).

COMMENTS. Adult collected July 8 in a Malaise trap. This species is recorded as breeding in living stems of raspberry and blackberry plants (Dillon and Dillon 1961).

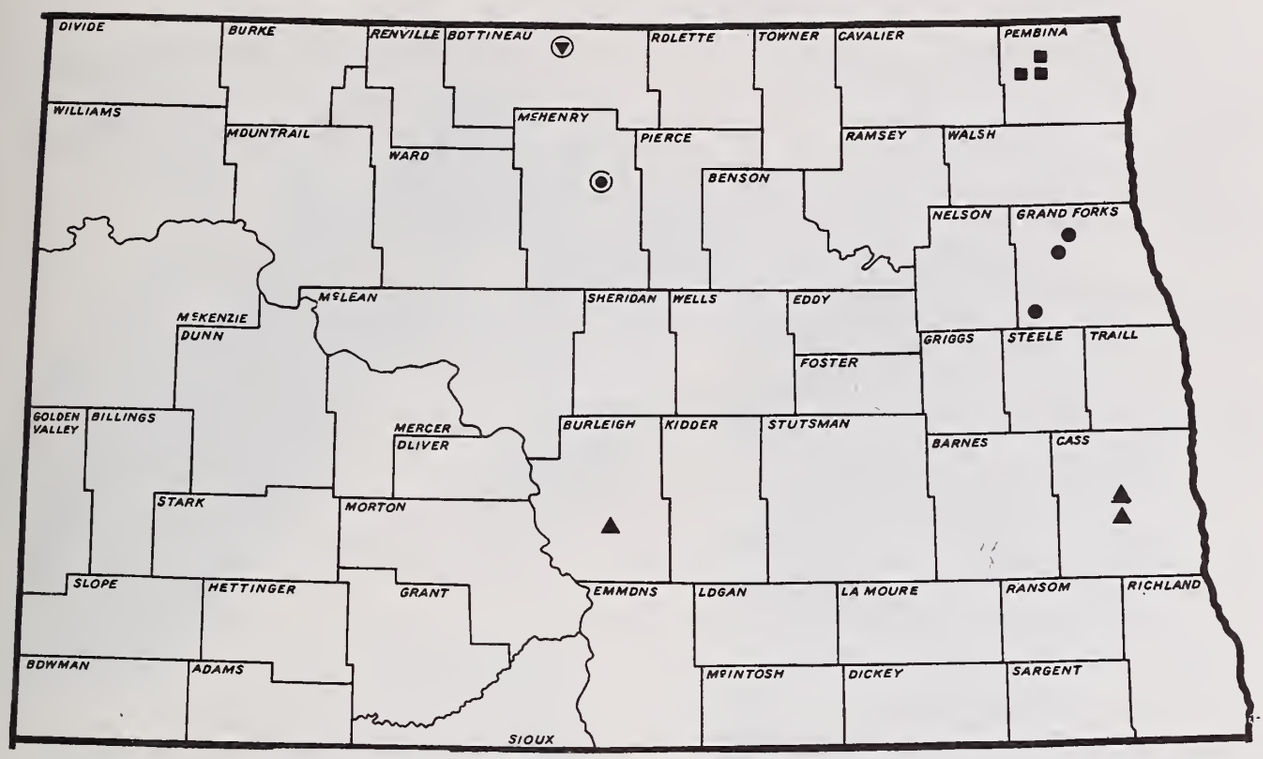


Figure 11.—Distribution of *Oberea basalis* (▼), *Oberea bimaculata* (■), *Oberea quadricallosa* (◉), *Oberea tripunctata* (●), and *Obrium rufulum* (▲).

***Oberea bimaculata* (Olivier)**
—Raspberry-cane borer

[Subfamily:Lamiinae]

SIZE. 9.0 mm.

DISTRIBUTION. Cavalier and Pembina Counties (fig. 11).

HOSTS. *Rubus* spp. (Dillon and Dillon 1961).

COMMENTS. Adults collected from June 27 to July 28. This species is recorded as breeding in stems of living raspberry and blackberry plants (Beutenmuller 1896). Craighead (1923) states that the larvae mines the stems, hollowing them out and eventually causing the stems to break off. Numerous holes are cut to the exterior surface along the hollowed portion.

***Oberea quadricallosa* LeConte**

[Subfamily:Lamiinae]

SIZE. 9.0 mm.

DISTRIBUTION. McHenry County (fig. 11).

HOSTS. *Salix* spp. (Beutenmuller 1896); *Populus tremuloides.*

COMMENTS. Beutenmuller (1896) and Keen (1952) indicate that larvae have been found in the stems of willow. In North Dakota on May 11, larvae were infesting the top main stems of young aspen trees. Larvae bore down the stem and pack frass loosely in portions of the open gallery.

Larvae were removed and successfully reared on McMorran (1965) spruce budworm diet.

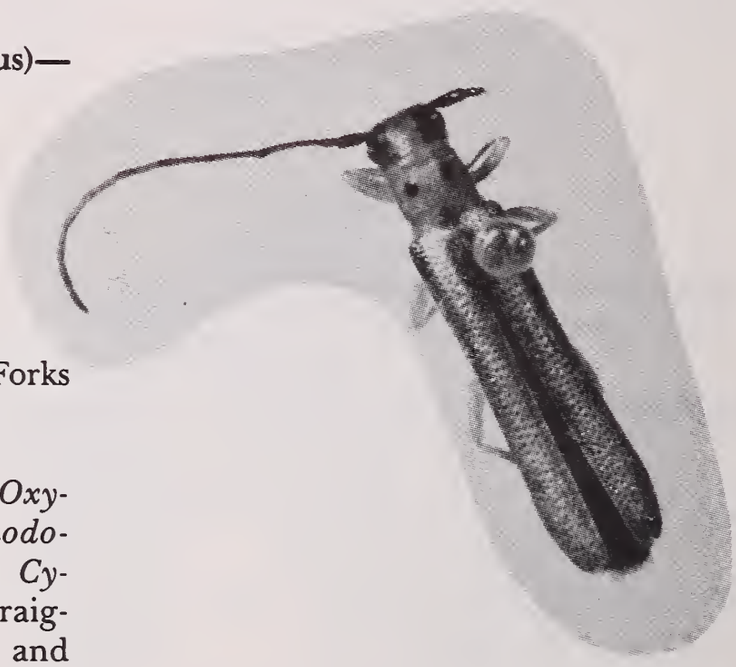
***Oberea tripunctata* (Swederus)—Dogwood twig borer**

[Subfamily:Lamiinae]

SIZE. 9.0 mm.

DISTRIBUTION. Grand Forks County (fig. 11).

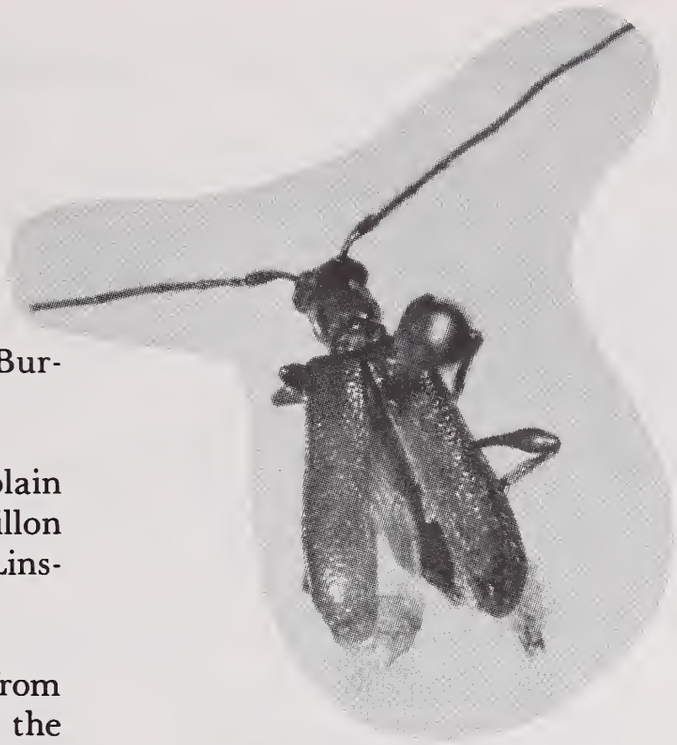
HOSTS. *Cornus, Ulmus* spp., *Oxydendum arboreum, Kalmia, Rhododendron, Viburnum, Prunus, Cydonia, Malus, Amygdalus* (Craighead 1923); *Populus* (Dillon and Dillon 1961); *Ribes idaeus* (Bird 1927); *Ribes* sp.



COMMENTS. Adults collected from June 13 to July 11. According to Craighead (1950), the female deposits her eggs in the living twigs of the host after girdling the tips. The larva bores down the center of the twig, making a series of holes for the expulsion of frass and cutting off portions of the twig as it bores on into the green wood. Larvae overwinter and pupate in the spring between two wads of fibrous frass. Coleman (1966) reported that the pupae overwinter in Georgia. Linsley (1961) listed this cerambycid as a host for the braconid *Bracon ceramycidiphagus* (Muesebeck). Gardiner (1970) has reported the successful rearing of *O. tripunctata* on artificial diet.

***Obrium rufulum* Gahan**

[Subfamily:Cerambycinae]



SIZE. 6.0 mm.

DISTRIBUTION. Cass and Burleigh Counties (fig. 11).

HOSTS. *Framus* spp. (Champlain et al. 1925); *Quercus* spp. (Dillon and Dillon 1961); *Fraxinus* sp. (Linsley 1963).

COMMENTS. Adults collected from July 10 to August 10. One of the adults had been swept from *Caragana arborescens*. The larvae bore in dead branches of ash, packing their mines tightly with frass. Although the life cycle is completed in a year, the beetles continue to breed in the same twigs for several generations (Linsley 1963). *Pimpla irritator* (Fabricius), *Aliolus stictipleurus* Martin, and *Metapelma spectabilis* Westwood are all hymenopterous parasites of *O. rufulum* (Linsley 1963, Peck 1963).

***Parandra brunnea brunnea* (Fabricius)—Pole borer**

[Subfamily:Parandrinae]

SIZE. 1.5 cm.

DISTRIBUTION. Burleigh and Cass Counties (fig. 12).

HOSTS. *Prunus cerasus, Salix alba, Ailanthus glandulosus, Pinus rigida* (Chittenden 1894); *Quercus, Populus, Castanea pumila, C. dentata, Acer* spp., *Tilia, Liriodendron, Pyrus, Ulmus americana, Paulounia* (Linsley 1962a).

COMMENTS. Adults collected on April 7 and August 3–10. Brooks (1915) states that the borer primarily attacks poles and other structural wood in contact with the ground. The adult also attacks shade trees, laying eggs on wounds or exposed heartwood. The larvae feed gregariously for 3 or 4 years, honeycombing the wood and packing the mines with granular frass. The oval pupal cell is plugged behind with a wad of fibrous frass (Kotinsky 1921). Often the adults do not emerge, but mate and lay eggs in the same cavity in which they are working (Brooks 1915, Kotinsky 1921, Baker 1972). According to Gardiner (1970), this species was successfully reared on artificial diet. *Odontocolon mellipes* (Say) (Brooks 1915) and *Pimpla* sp. (Riley 1880) have both been reported as parasites of this wood borer.

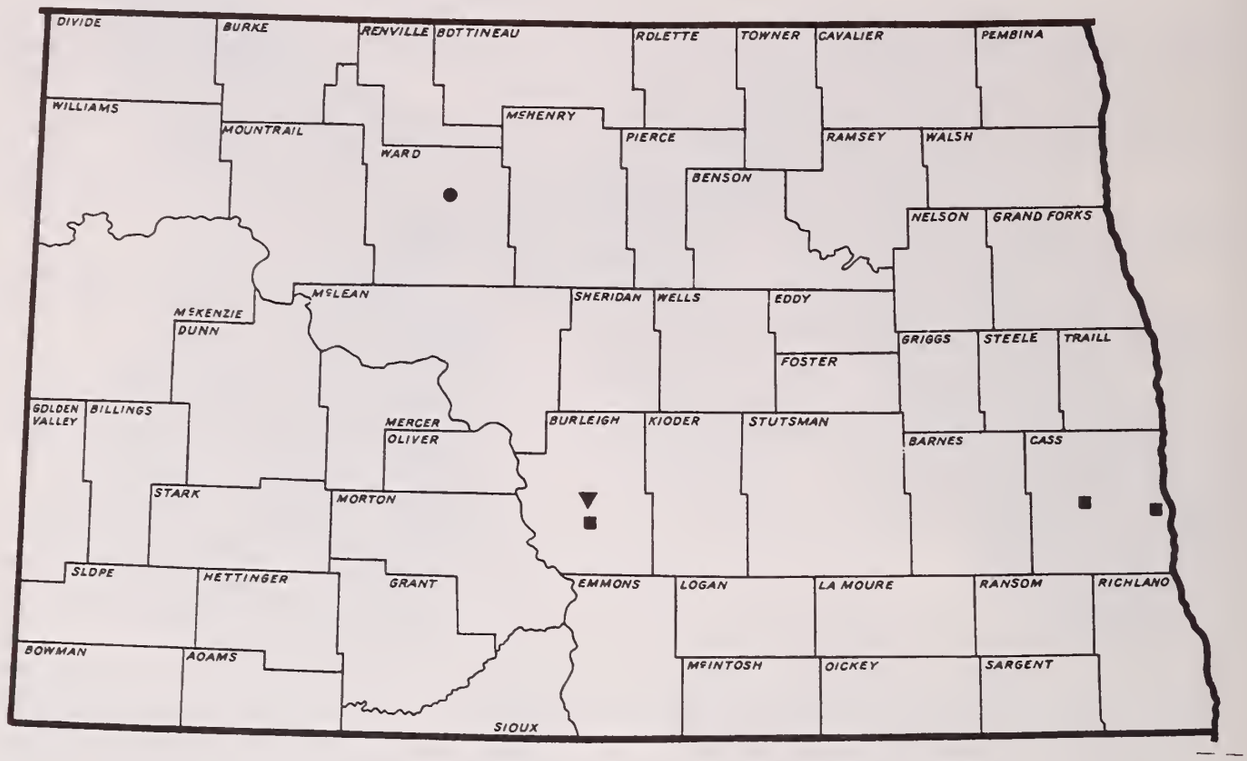
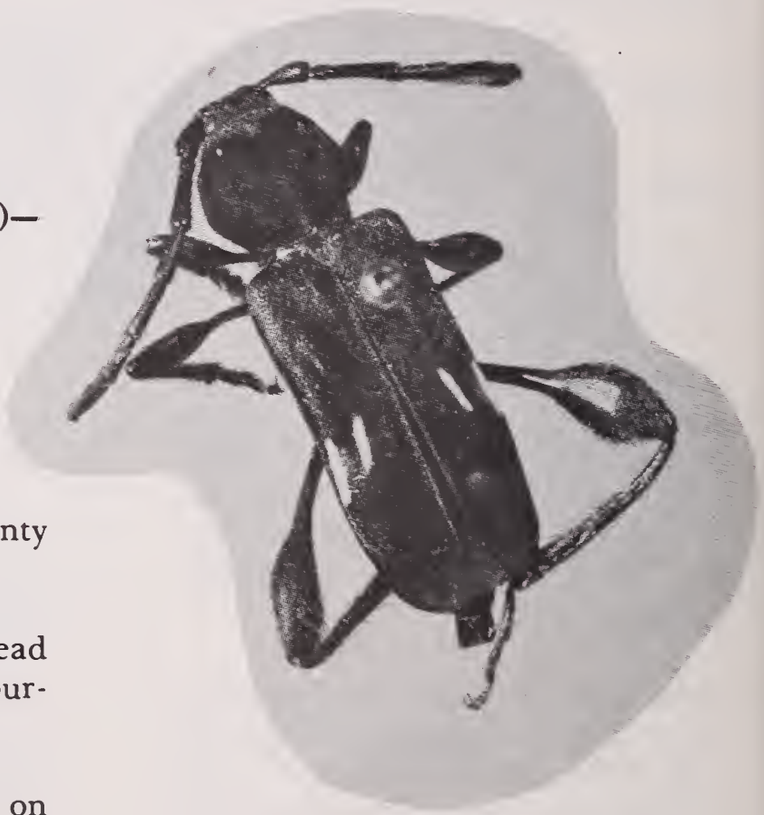


Figure 12.—Distribution of *Parandra brunnea brunnea* (■), *Physocnemun brevilineum* (●), and *Plectrodera scalator* (▼).



Physocnemum brevilineum (Say)—**Elm-bark borer**

[Subfamily:Cerambycinae]

SIZE. 1.6 cm.

DISTRIBUTION. Ward County (fig. 12).

HOSTS. *Ulmus* spp. (Craighead 1950); *Ulmus americana* (Haliburton 1951).

COMMENTS. Adult collected on June 20. According to Haliburton (1951), larvae infest the bark of both living and recently dead American elms. Although this species is recorded as living in the outer bark, it also injures the inner bark and may kill patches of the cambium. Adults are often collected on sunny portions of the trunk.

Plectrodera scalator **(Fabricius)—Cottonwood borer**

[Subfamily:Lamiinae]

SIZE. 2.8 cm.

DISTRIBUTION. Burleigh County (fig. 12).

HOSTS. *Populus* spp., *Populus deltoides, Salix* spp. (Milliken 1916, Dillon and Dillon 1941).

COMMENTS. Adults collected on August 8. As reported by Milliken (1916) and summarized by Baker (1972), the cottonwood borer breeds in the base of living cottonwoods and willows. Adults appear in late spring or early summer and feed on the tender shoots of young trees. These shoots often break, shrivel, and turn black. Eggs are deposited in the bark below the groundline at the base of the tree. Young saplings and nursery stock are subject to attack, but larger trees are usually selected. The larvae feed in the phloem, mining downward and commonly entering a large root by fall. The second summer they continue feeding and excavating galleries, and pushing out coarse frass through holes made near the egg slits. The base of infested trees may be practically riddled by their tunnels. Two years are required to complete the life cycle. Damage may also be serious in natural stands growing on poor sites (Morris 1963).

Pogonocherus mixtus **Haldeman**

[Subfamily:Lamiinae]

SIZE. 6.0 mm.

DISTRIBUTION. McHenry County (fig. 13).

HOSTS. *Pyrus, Salix* spp. (Beutenmuller 1896, Leng and Hamilton 1896); *Pinus* sp., *Picea* sp. (Craighead 1923); *Pinus ponderosa.*

COMMENTS. According to Leng and Hamilton (1896), this species is found on pear, and the larvae infest dead branches of willow. In North Dakota we have reared adults from ponderosa pine that had been cut in 1968 and caged in June of 1970. Adults emerged on July 15 and August 4. *Neoclytus muricatulus muricatulus* was reared from the same material. Gardner (1970) reported successfully rearing *P. mixtus* on an artificial diet.

Linsley (1961) states that the clerid beetle *Cregya oculata* (Say) is a predator of this wood borer.

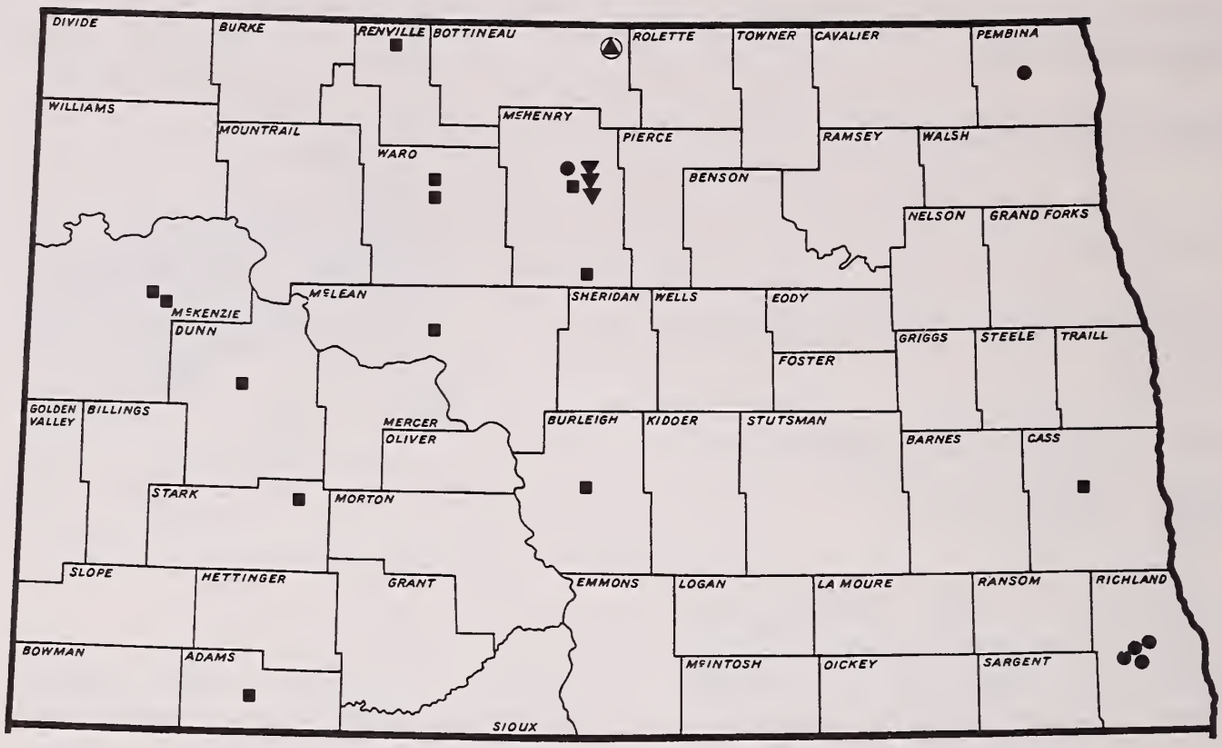


Figure 13.—Distribution of *Pogonocherus mixtus* (▼), *Pogonocherus parvullus* (▲), *Prionus fissicornis* (■), and *Prionus imbricornis* (●).

Pogonocherus parvullus **LeConte**

[Subfamily: Lamiinae]

SIZE. 4.0 mm.

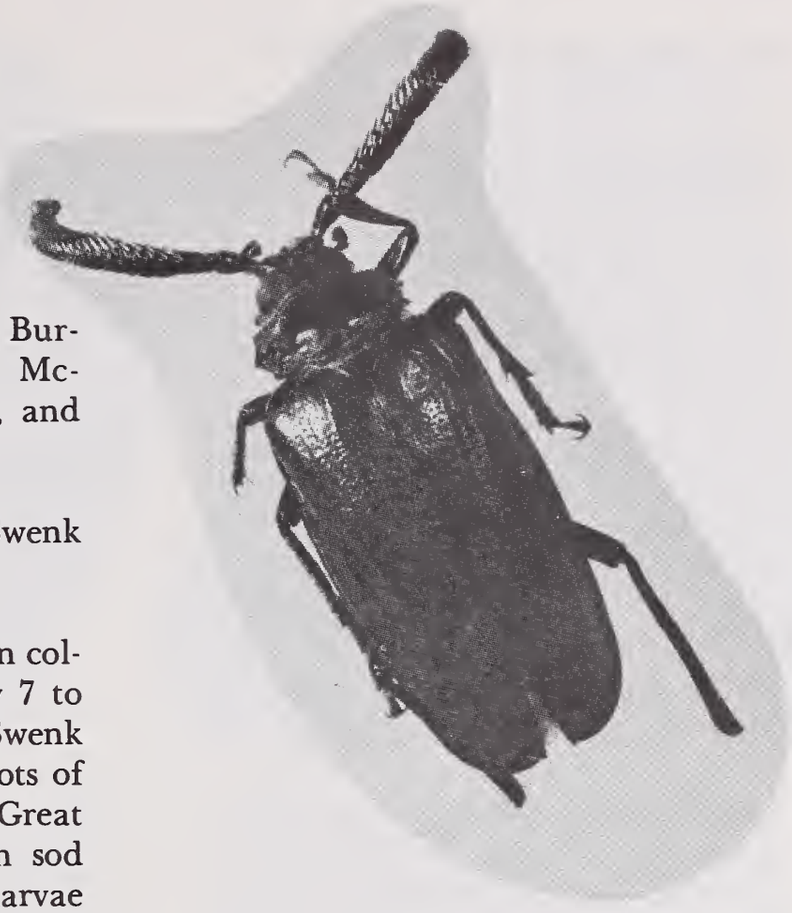
DISTRIBUTION. Bottineau County (fig. 13).

HOSTS. *Salix* sp.

COMMENTS. Lower live willow branches were infested with larvae. Host material was caged on April 29 and adults emerged on May 10 and June 1.

Prionus fissicornis Haldeman

[Subfamily:Prioninae]



SIZE. 2.8 cm.

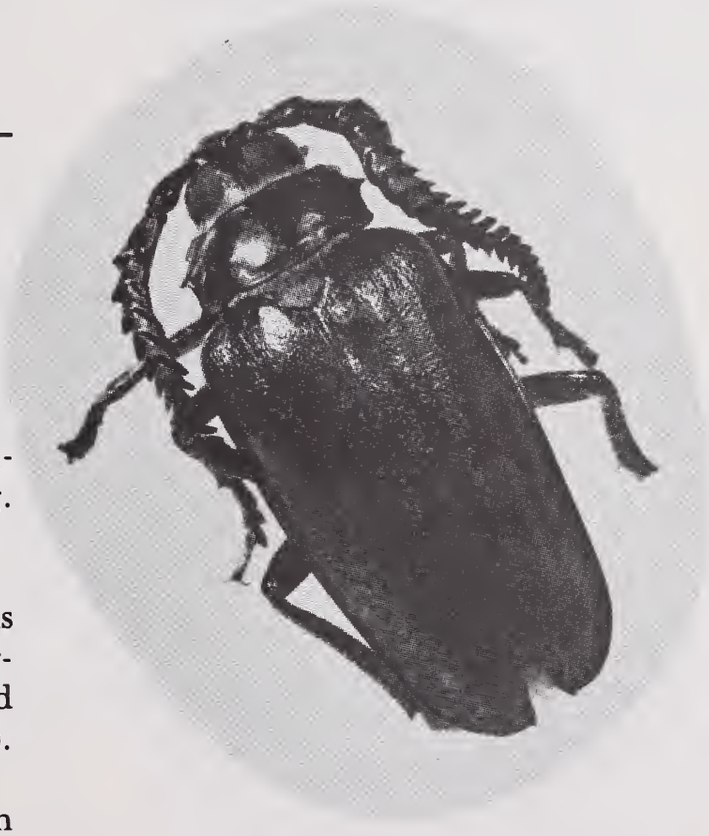
DISTRIBUTION. Adams, Burleigh, Cass, Dunn, McHenry, McKenzie, Renville, Stark, Ward, and McLean Counties (fig. 13).

HOSTS. Maize, native grasses (Swenk 1922).

COMMENTS. Adults have been collected in light traps from May 7 to September 29. According to Swenk (1922), this species feeds on roots of various native grasses of the Great Plains. Field maize planted in sod has been severely damaged by larvae boring up into the heart of the cornstalk 2 to 5 cm above the ground.

Prionus imbricornis (Linnaeus)—**Tile-horned prionus**

[Subfamily:Prioninae]



SIZE. 3.0 cm.

DISTRIBUTION. McHenry, Pembina, and Richland Counties (fig. 13).

HOSTS. *Vitis, Pyrus,* herbaceous plants (Beutenmuller 1896); *Quercus, Castanea dentata* (Craighead 1915); *Sorbus,* Maize (Linsley 1962a).

COMMENTS. Adults collected in light traps from June 18 to August 12. The larvae are usually found in living roots of oak and chestnut (Craighead 1915), but Beutenmuller (1896) has reported them infesting grape, pear, and several herbaceous plants. According to Craighead (1915), eggs are laid at the base of the tree; larvae eventually penetrate the heartwood and completely hollow out the roots. The larval period lasts 3 or more years. When the larvae leave the roots, they construct an earthen pupal cell several cm below the soil surface. Adults emerge from the ground during midsummer.

Psenocerus supernotatus (Say)—
Currant-tip borer

[Subfamily:Lamiinae]

SIZE. 5.0 mm.

DISTRIBUTION. Bottineau, Cass, and Grand Forks Counties (fig. 14).

HOSTS. *Ulmus, Liriodendron tulipifera, Salix, Ampelopsis quinquefolia* (Champlain et al. 1925); *Castanea dentata, Carya, Rhus, Cornus, Ribes, Lonicera, Liquidambar, Celastrus* (Knull 1946); *Euonymus, Hicoria* (Craighead 1923); *Prunus virginiana* (Bird 1927).

COMMENTS. Adults collected from June 15 to August 16 at flowers or in a Malaise trap. Larvae infest dead branches of the host (Champlain et al. 1925, Knull 1946). The larvae first extend their tunnels under the bark. and then mine into the wood and pupate in the spring in a cylindrical cell (Craighead 1923).

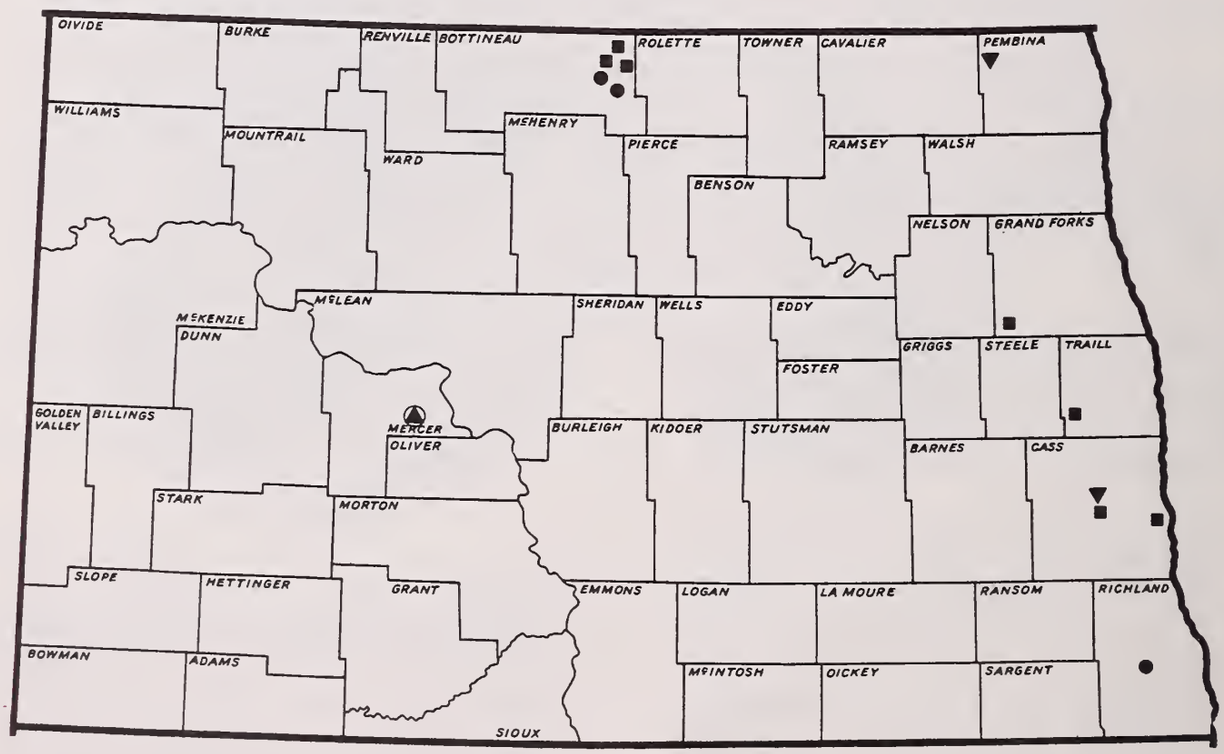


Figure 14.—Distribution of *Psenocerus supernotatus* (■), *Psyrassa unicolor* (▼), *Purpuricenus humeralis* (●), and *Ropalopus sanguinicollis* (▲).

***Psyrassa unicolor* (Randall)**

[Subfamily:Cerambycinae]

SIZE. 9.0 mm.

DISTRIBUTION. Cass and Pembina Counties (fig. 14).

HOSTS. *Juglans nigra, Fagus americana, Carya, Quercus* (Champlain et al. 1925); *Prunus, Cercis canadensis* (Knull 1946); *Morus rubra, Vitis* (Linsley 1963).

COMMENTS. Adults collected in light traps from June 2 to August 1. According to Champlain et al. (1925), the larvae infest live twigs and girdle them near a node. Girdled twigs usually fall to the ground in the spring. The incision for severing the branches is oblique rather than transverse, and the life cycle is complete in 1 year (Craighead 1923). Both of the ichneumons *Agonocryptus discoidaloides* (Viereck) and *Labena grallator* (Say) have been recorded as parasites of this wood borer (Muesebeck et al. 1951).

***Purpuricenus humeralis* (Fabricius)**

[Subfamily:Cerambycinae]

SIZE. 1.2 cm.

DISTRIBUTION. Bottineau and Richland Counties (fig. 14).

HOSTS. *Quercus, Betula, Castanea dentata, Robinia pseudoacacia* (Knull 1946); *Carya, Alnus rugosa, Morus rubra, Cercis canadensis, Acer* (Linsley 1962b).

COMMENTS. Adults collected in Malaise traps from July 22 to August 2. Larvae occur in oak stumps (Beutenmuller 1896) or dead branches of the host material. According to Craighead (1923), the larvae mine beneath the bark, and then tunnel into the heartwood to pupate. In the process of excavating their galleries, larvae push out large quantities of granular frass through openings in the bark. Normally 2 years are required to complete the life cycle.

Ropalopus sanguinicollis **(Horn)**

[Subfamily:Cerambycinae]

SIZE. 1.1 cm.

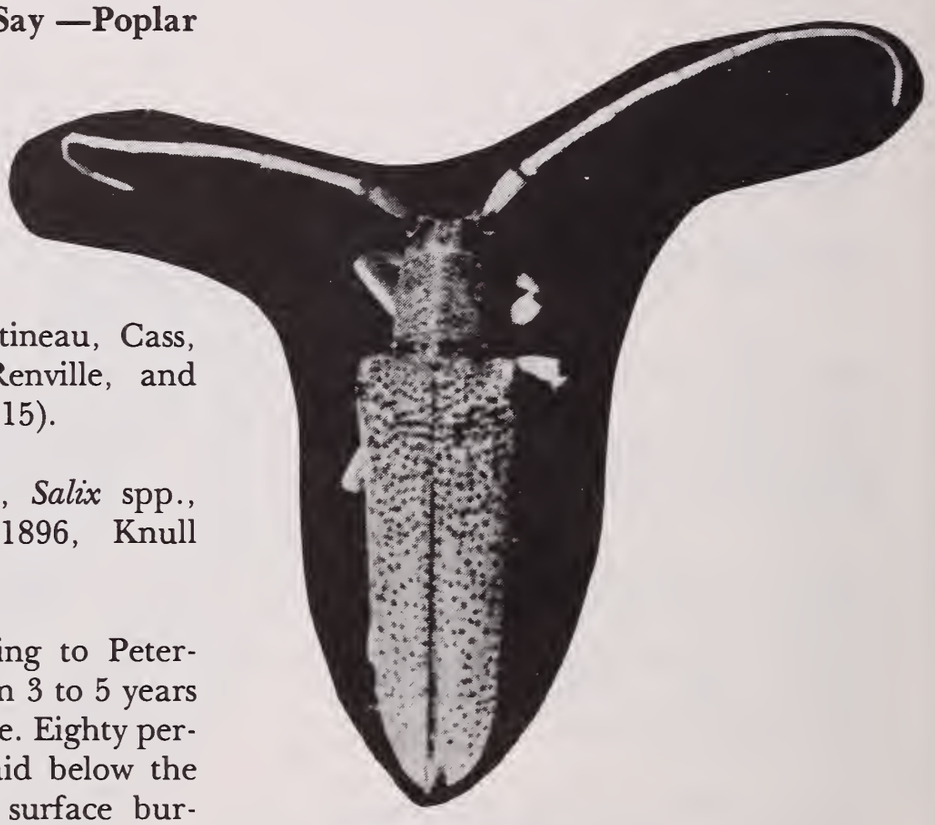
DISTRIBUTION. Mercer County (fig. 14).

HOSTS. *Prunus* spp. (Bird 1927); *Prunus virginiana.*

COMMENTS. According to Bird (1927), the larvae tunnel beneath the bark of live wild cherry, packing the burrows with granular frass. At the end of 2 years, the larvae enter the heartwood and construct a pupal cell at the end of a 15- to 30-cm tunnel. Adults apparently emerge in June and July. In North Dakota, larvae were removed from live wood of chokecherry (*Prunus virginiana)* and placed upon McMorran's (1965) artificial diet October 26. The larvae underwent a cold treatment from November 1 to February 14, pupated February 24, and adults emerged March 10.

Saperda calcarata **Say —Poplar borer**

[Subfamily:Lamiinae]



SIZE. 2.1 cm.

DISTRIBUTION. Bottineau, Cass, McHenry, Ransom, Renville, and Richland Counties (fig. 15).

HOSTS. *Populus* spp., *Salix* spp., *Tilia* (Beutenmuller 1896, Knull 1946).

COMMENTS. According to Peterson (1947), it takes from 3 to 5 years to complete the life cycle. Eighty percent of the eggs are laid below the foliage canopy. Small surface burrows are made during the first season and later expanded into a "feeding chamber" with a larger tunnel leading up into the heartwood. Hibernation and pupation occur at the upper end of this tunnel. The adults emerge during June and July. Gardiner (1970) reported successfully rearing *S. calcarata* on artificial diet.

The incidence of attack increases with the age and diameter of the

tree (Abrahamson and Newsome 1972), and decreases with high stand density (Peterson 1947) and wet weather (Graham and Mason 1958). Wong et al. (1963) indicated that a particular form of *S. calcarata* observed in Manitoba and Saskatchewan prefers to attack the root collar of small-diameter trees. Peterson (1947) also reported mortality caused by the parasites *Eutheresia canescens* (Walker), *Ichneumon* sp., *Campoplex* sp., *Campoplex sulcatellus* Viereck, and *Cremastus* sp. He noted that third- and fourth-year larvae and pupae in smaller trees were susceptible to woodpecker predation.

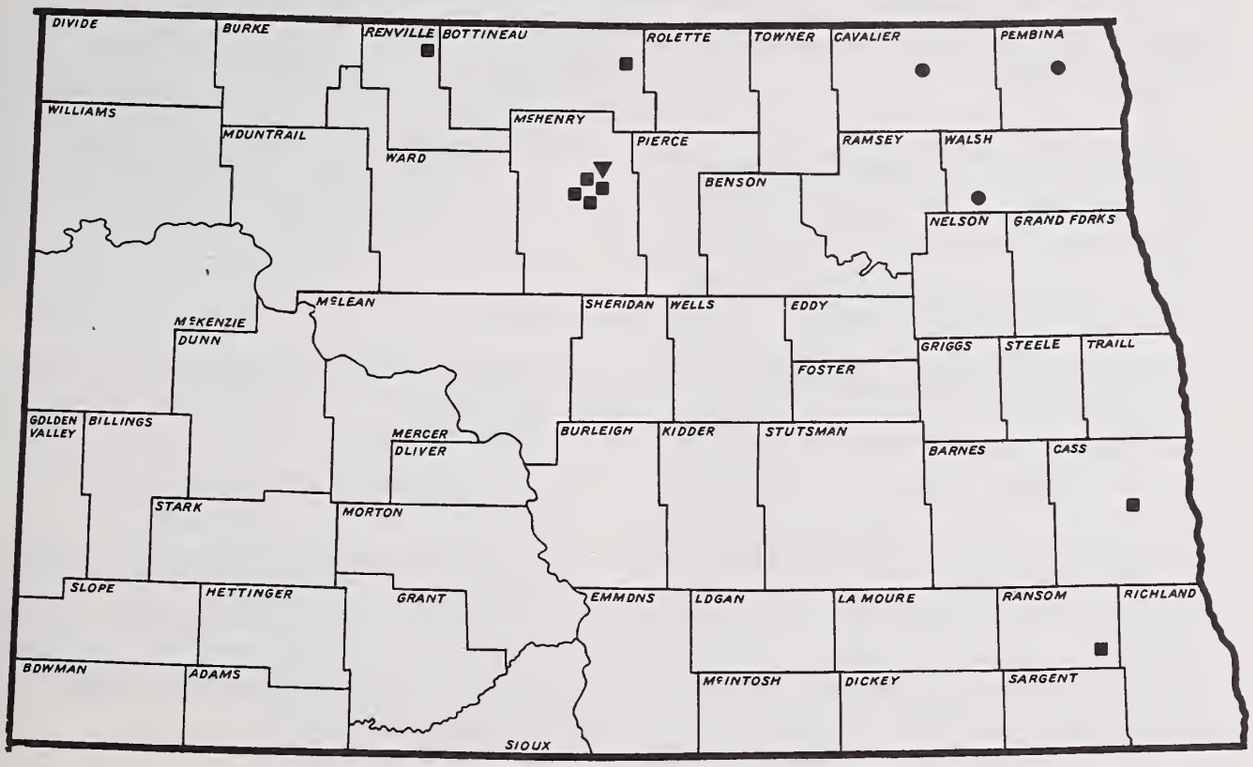


Figure 15.—Distribution of *Saperda calcarata* (■), *Saperda candida bipunctata* (●), and *Saperda concolor* (▼).

***Saperda candida bipunctata* Hopping —Roundheaded apple tree borer**

[Subfamily:Lamiinae]

SIZE. 1.1 cm.

DISTRIBUTION. Pembina and Walsh Counties (fig. 15).

HOSTS. *Pyrus, Malus, Prunus* spp., *Sorbus, Amelanchier alnifolia, Crataegus* spp., *Cydonia* (Beutenmuller 1896); *Aronia* spp. (Knull 1946); *Amydalus* (Craighead 1923).

COMMENTS. Adults collected from June 31 to July 12. According to Becker (1918), adults deposit eggs at the base of living trees. The larvae feed beneath the bark for 1 year and then bore into the wood, making large excavations. The hymenopterans *Melittobia chalybii* Ashmead (Peck 1963) and *Cenocoelius saperdae* (Ashmead) (Linsley 1961) have been recorded as parasites.

Saperda concolor **LeConte**

[Subfamily:Lamiinae]

SIZE. 9.0 mm.

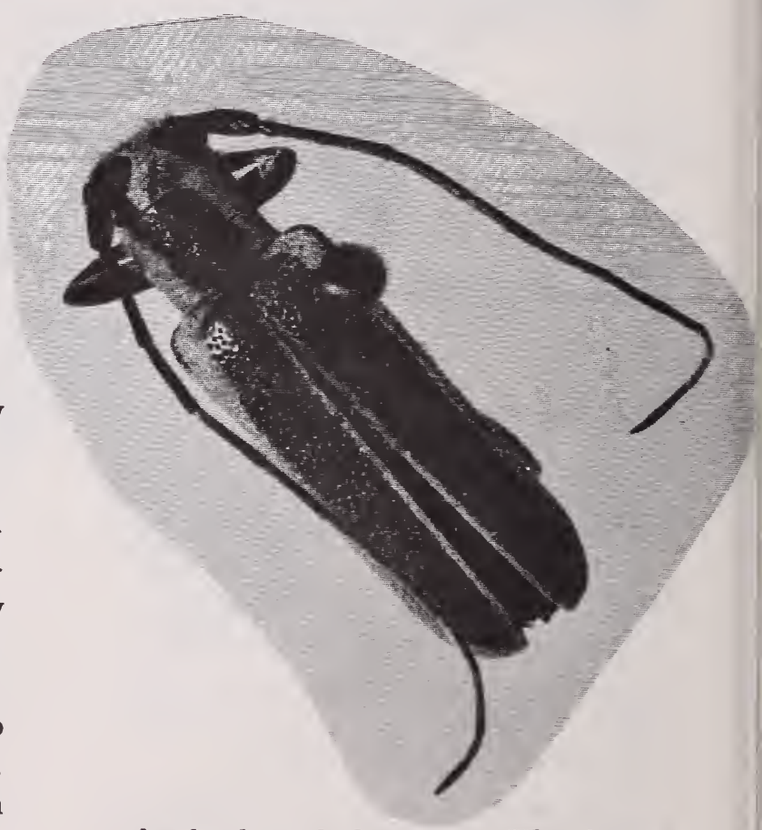
DISTRIBUTION. McHenry County (fig. 15).

HOSTS. *Populus* spp., *Salix* (Beutenmuller 1896).

COMMENTS. A single collection made on May 11. McLeod and Wong (1967) state that the preferred host is willow, with an occasional collection from trembling aspen. This species generally has a 2-year life cycle. Eggs are laid on small branches, and larval activity results in a gall 4 inches in length, twice the diameter of the stem, and characterized by alternating ridges and depressions. McLeod and Wong also record the following larval parasites: *Cubocephalus contatus* Townes & Gupta, *Cubocephalus prolixus* Townes, *Dolichomitus messor perlongus* (Cresson), *Dolichomitus populneus* (Retzius), *Dolichomitus* sp. nr. *messor, Xylophrurus bicolor bicolor* (Cushman), *Bracon* n. sp., *Meteorus* n. sp., *Meteorus tibialis* Muesebeck, *Odinia boletina* (Zetterstedt). They noted that the black-backed three-toed woodpecker (*Picoides arcticus)* was an avian predator.

Saperda lateralis lateralis **Fabricius**

[Subfamily:Lamiinae]



SIZE. 1.0 cm.

DISTRIBUTION. Ransom County (fig. 16).

HOSTS. *Acer, Carya, Fraxinus, Ulmus, Tilia, Quercus, Prunus* (Craighead 1923); *Pinus virginiana* (Perry 1975).

COMMENTS. This species seems to be somewhat rare in North Dakota. Specimens have been collected from July 10 to 16. Craighead (1923) records the larvae as infesting dead host material and mining between the bark and the wood. The 1-year life cycle takes place in moist wood, preferably at the base of trees.

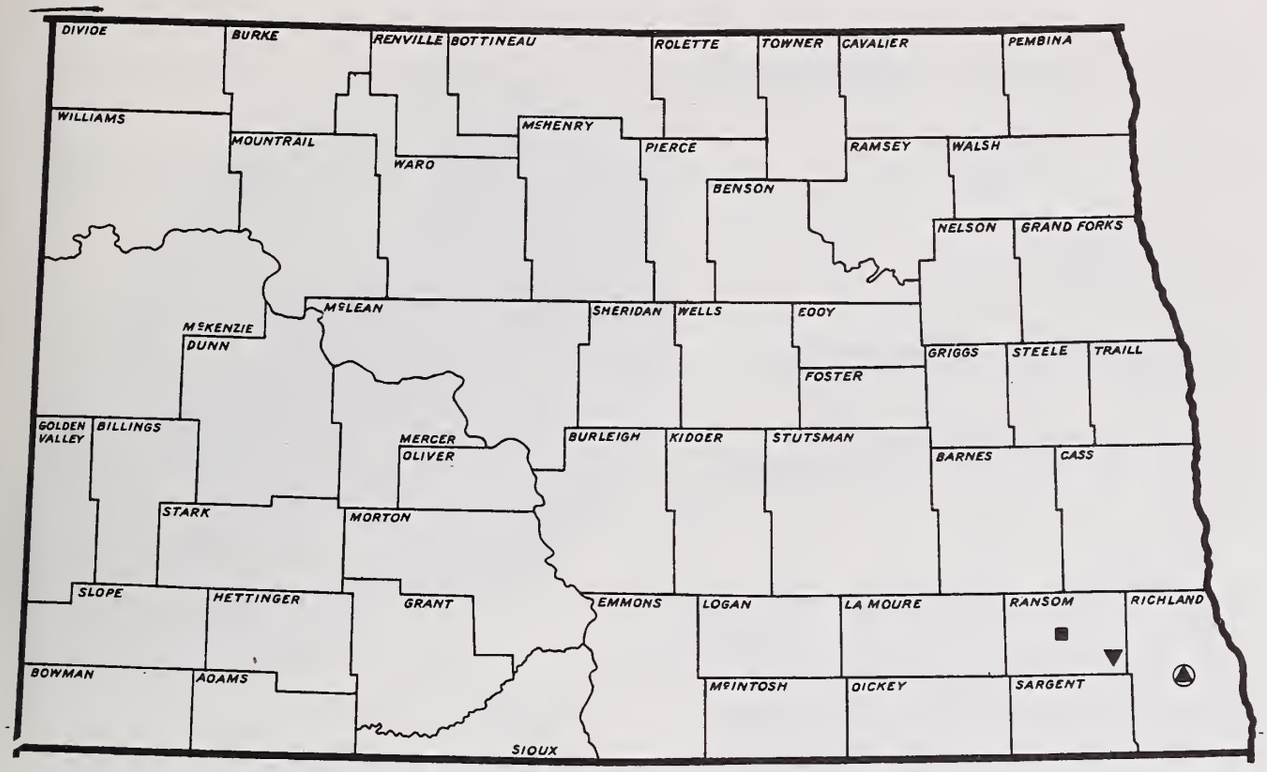


Figure 16.—Distribution of *Saperda lateralis lateralis* (■), *Saperda mutica* (▼), and *Saperda vestita* (▲).

Saperda mutica Say

[Subfamily:Lamiinae]

SIZE. 1.5 cm.

DISTRIBUTION. Ransom County (fig. 16).

HOSTS. *Salix* spp. (Baker 1972).

COMMENTS. This species is somewhat rare in North Dakota, and has been collected on only two occasions in late July. According to Baker (1972), the larvae infest dead willow.

Saperda vestita Say —Linden borer

[Subfamily: Lamiinae]

SIZE. 1.7 cm.

DISTRIBUTION. Richland County (fig. 16).

HOSTS. *Tilia* and *Populus* (Baker 1972).

COMMENTS. Apparently rare in North Dakota. One adult collected on June 15. Baker (1972) states that adults feed on leaf petioles, the larger veins of leaves, and the bark of growing shoots. The larvae first feed beneath the bark and then bore deep into the heartwood. Unhealthy and weakened trees are particularly susceptible to attack. Kotinsky (1921) indicates that larvae are found in exposed roots, lower limbs, and the root collar area. Gardiner (1970) reported that this species was successfully reared on artificial diet.

Stenocorus schaumi (LeConte)

[Subfamily: Lepturinae]

SIZE. 2.0 cm.

DISTRIBUTION. Cass County (fig. 17).

HOSTS. *Populus* (Craighead 1923).

COMMENTS. Adult collected on July 12. Craighead (1923) reports rearing this species from cottonwood twigs. Riley (1892) describes the habits of this species in cotton.

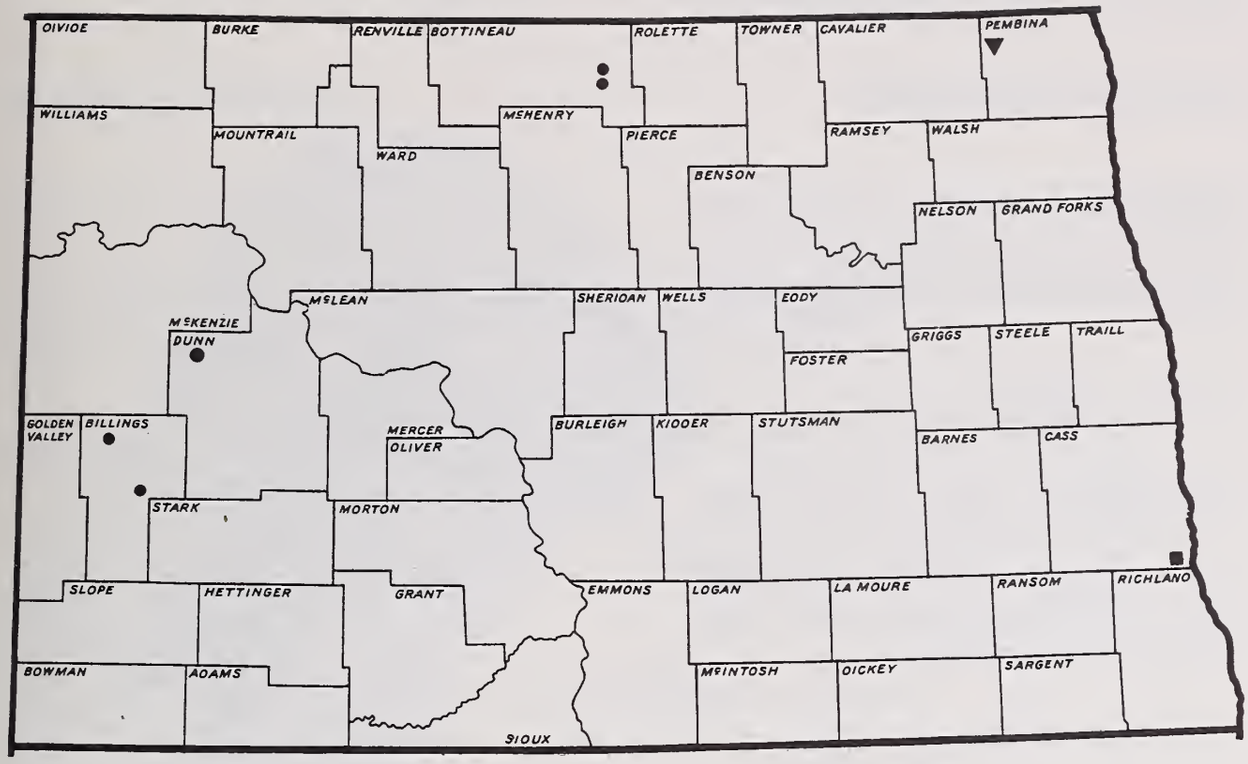
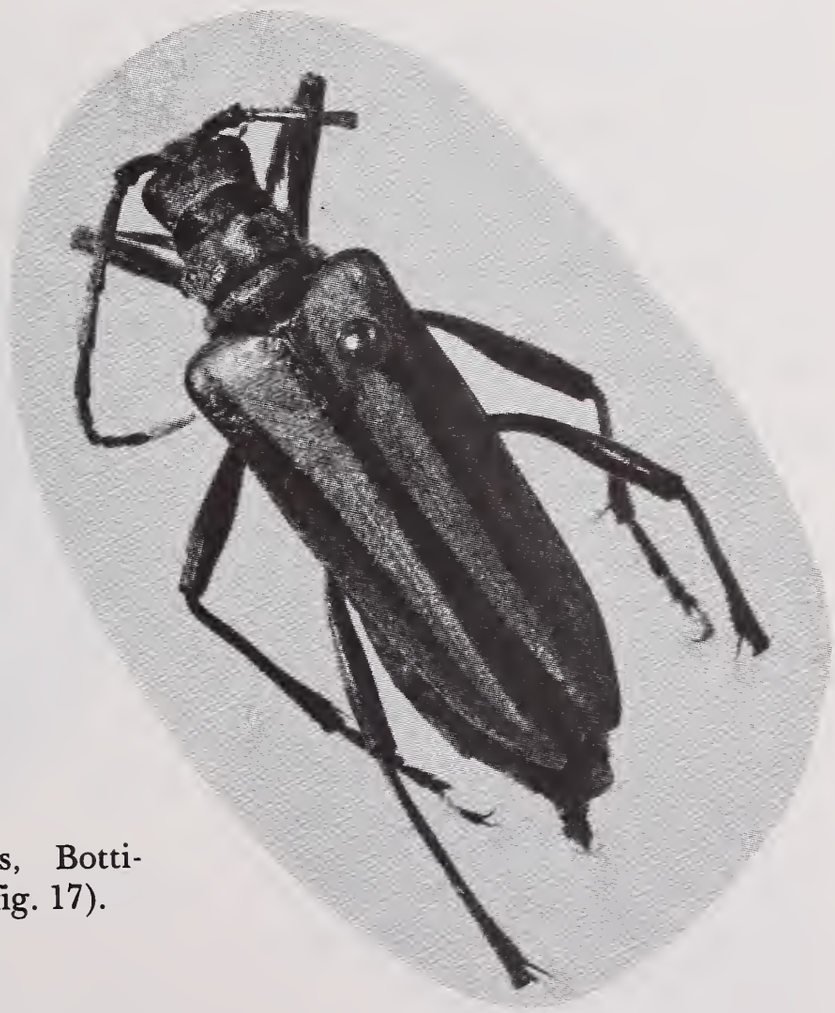


Figure 17.—Distribution of *Stenocorus schaumi* (■), *Stenocorus trivitatus* (●), and *Stenocorus vittiger* (▼).



Stenocorus trivitatus (Say)

[Subfamily:Lepturinae]

SIZE. 1.7 cm.

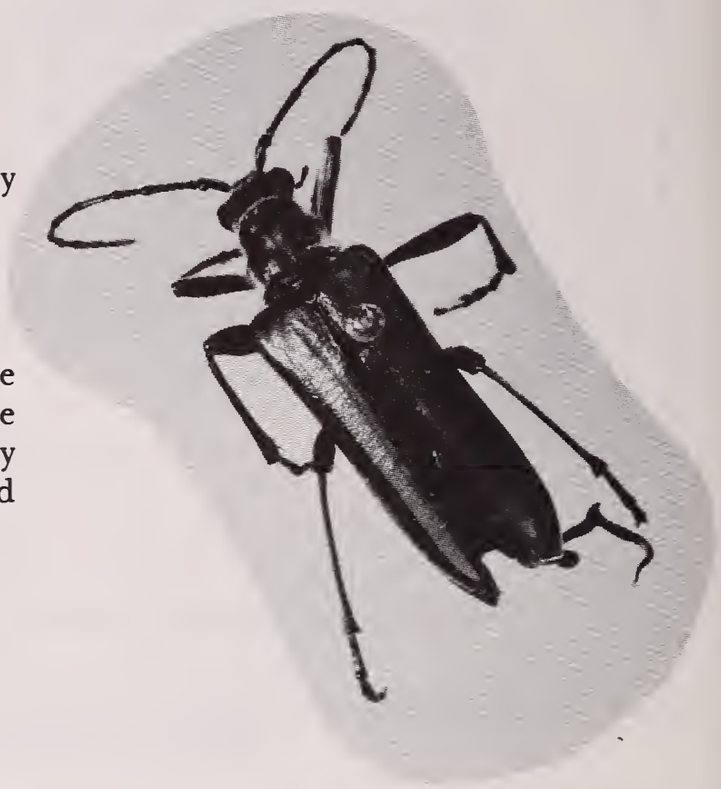
DISTRIBUTION. Billings, Bottineau, and Dunn Counties (fig. 17).

HOSTS. Unknown.

COMMENTS. Adult flight period occurs between July 13 and August 8. Adults were collected with a Malaise trap.

Stenocorus vittiger **(Randall)**

[Subfamily:Lepturinae]



SIZE. 1.0 cm.

DISTRIBUTION. Pembina County (fig. 17).

HOSTS. Unknown.

COMMENTS. Adult collected June 27. According to Knull (1946), the adults frequent flowers, especially those of *Hydrangea arborescens* and *Viburnum acorfolium.*

Sternidius alpha **(Say)**

[Subfamily:Lamiinae]

SIZE. 5.0 mm.

DISTRIBUTION. Bottineau County (fig. 18).

HOSTS. *Rhus glabra, Malus* (Beutenmuller 1896); *Platanus* (Dillon and Dillon 1961); *Acer, Ampelopsis, Carya, Castanea, Celastrus, Celtis, Diospyros, Juglans, Morus, Quercus, Robinia* (Craighead 1923).

COMMENTS. Adult collected in Malaise trap on July 26. The larvae infest small twigs of the host, pupating in the wood (Craighead 1923). Linsley (1961) listed the braconids *Cenocoelius ashmeadii* Dalla Torre, *Cenocoelius provancheri* (Rohwer), and *Heterospilus liopodis* (Brues) as parasites of this beetle.

***Sternidius alpha misellus* LeConte**

[Subfamily:Lamiinae]

SIZE. 5.0 mm.

DISTRIBUTION. Bottineau and Richland Counties (fig. 18).

HOSTS. *Acer negundo.*

COMMENTS. Adults were collected in late July on the bark of boxelder by a chemical collecting method (Stein 1975).

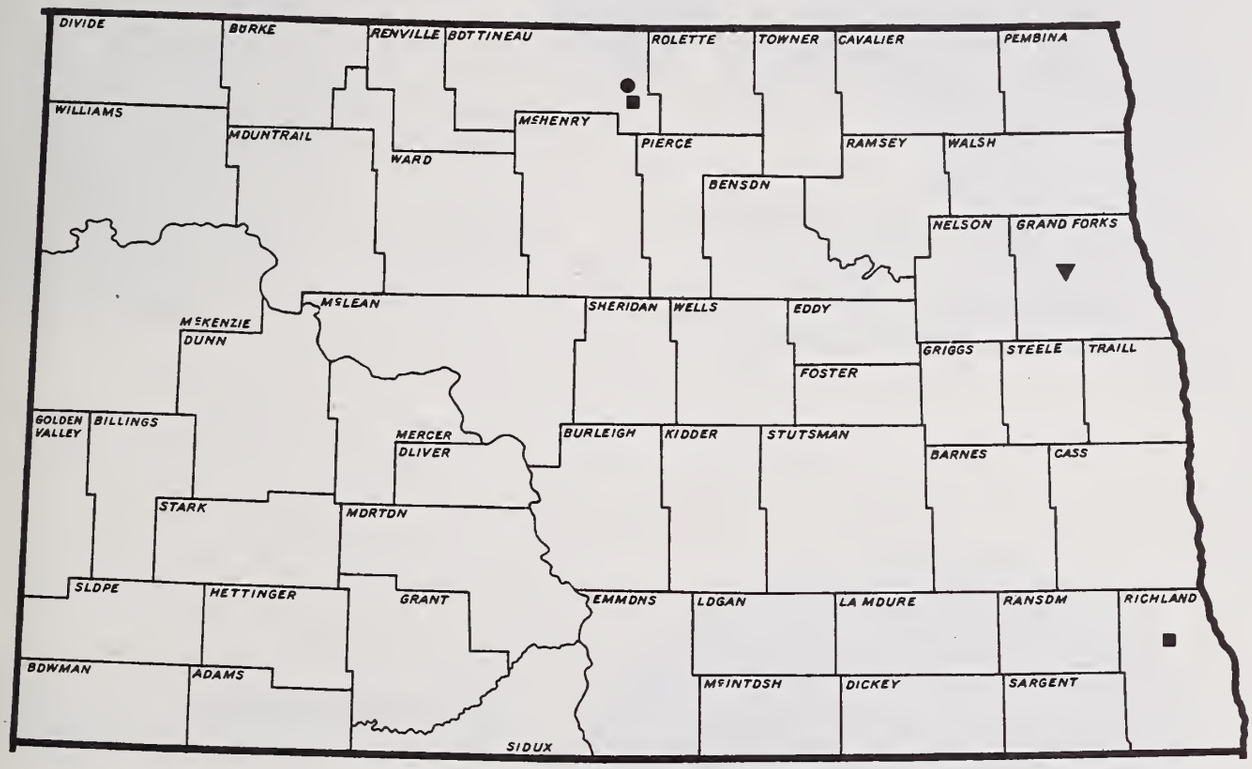


Figure 18.—Distribution of *Sternidius alpha* (●), *Sternidius alpha misellus* (■), and *Strangalia famelica* (▼).

***Strangalia famelica* (Newman)**

[Subfamily:Lepturinae]

SIZE. 1.4 cm.

DISTRIBUTION. Grand Forks County (fig. 18).

HOSTS. *Betula, Quercus* (Knull 1946).

COMMENTS. Adults collected on July 11. Knull (1946) reported this species breeding in decayed yellow birch and oak. The adults are known to visit flowers, especially wild rose.

Tetraopes annulatus LeConte

[Subfamily:Lamiinae]

SIZE. 1.0 cm.

DISTRIBUTION. Burleigh, Pembina, Ramsey, Ransom, Richland, and Sheridan Counties (fig. 19).

HOSTS. *Asclepias subverticillata, A. verticillata, A. viridiflorus, A. speciosa* (Chemsak 1963).

COMMENTS. Adults have been collected from June 20 to August 7. According to Chemsak (1963), this beetle infests several species of milkweeds.

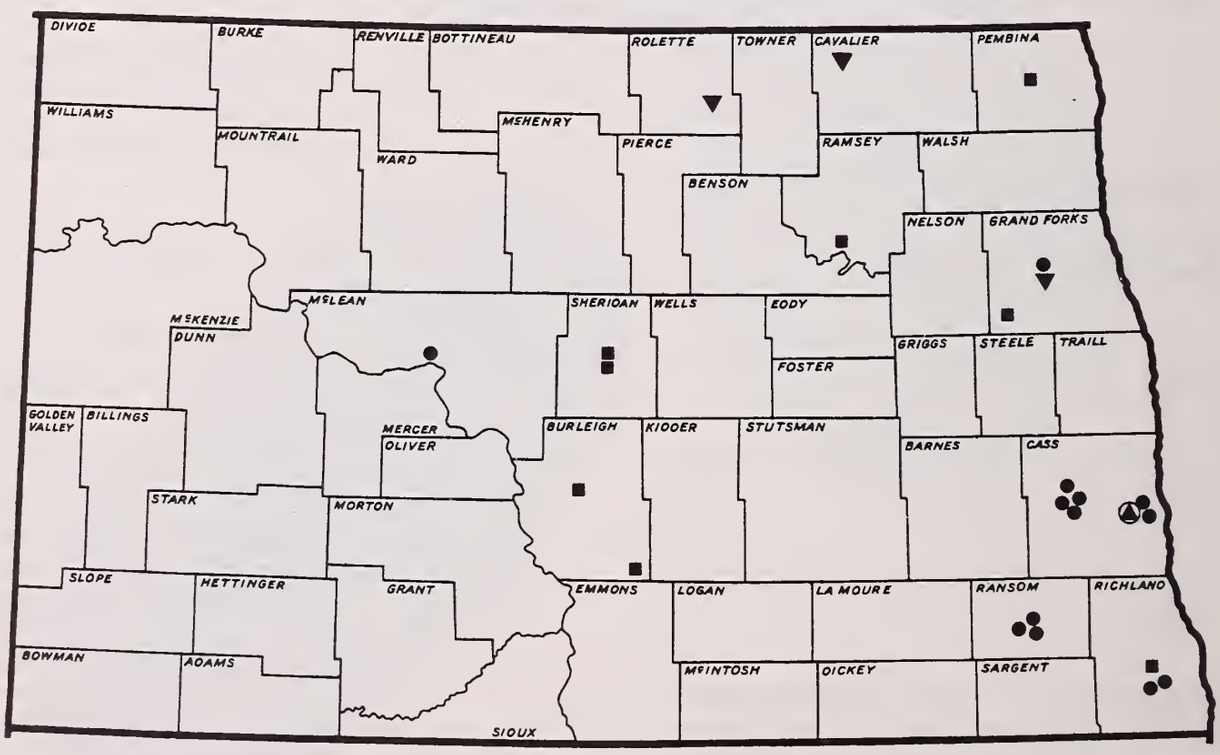
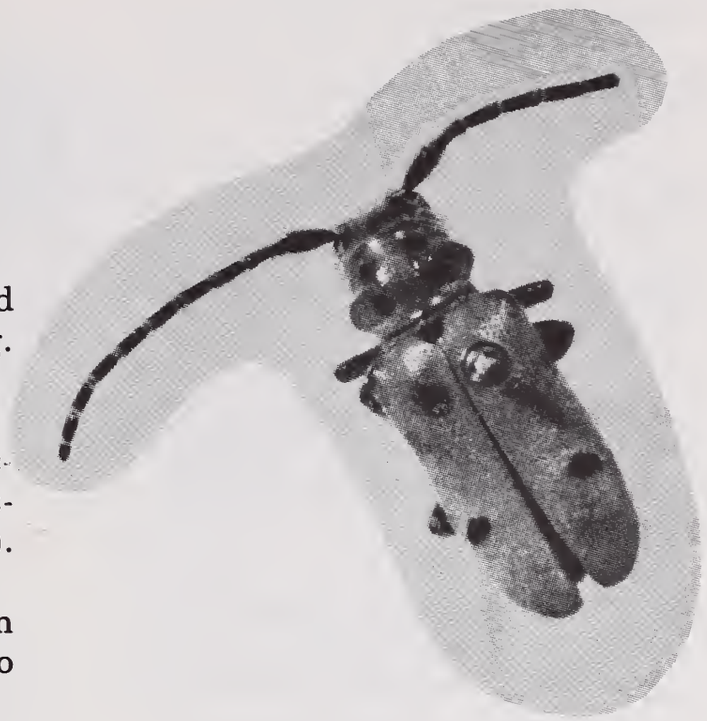


Figure 19.—Distribution of *Tetraopes annulatus* (■), *Tetraopes femoratus* (▼), *Tetraopes tetraophthalmus* (●), and *Tragidion armatum* (▲).

Tetraopes femoratus **LeConte**

[Subfamily:Lamiinae]



SIZE. 9.0 mm.

DISTRIBUTION. Cavalier, Grand Forks, and Pembina Counties (fig. 19).

HOSTS. *Asclepias syriaca, A. latifolia, A. viridis, A. hallii, A. fascicularis, A. lemmonii* (Chemsak 1963).

COMMENTS. Adults collected from August 2 to 22. Larvae known to infest several species of milkweeds.

Tetraopes tetraophthalmus **(Foster) —Milkweed beetle**

[Subfamily:Lamiinae]

SIZE. 1.1 cm.

DISTRIBUTION. Cass, Grand Forks, McLean, Ransom, and Richland Counties (fig. 19).

HOSTS. *Asclepias syriaca, A. incarnata, A. perennis, Apocynum cannabium, A. viridiflorus* (Chemsak 1963).

COMMENTS. Adults collected from June 2 to August 28. This species breeds in milkweed. Craighead (1923) found that the larvae migrate in the soil from one root to another, usually consume the bark of the root without mining the pith, and then pupate in the soil near the surface of the ground. According to Gardiner (1961a), the adult beetle lays her eggs in dry milkweed or grass stubs. Within 10 days the eggs hatch. The larvae enlarge the oviposition hole and drop to the ground. Gardiner (1970) also reported successful rearing of this species from the egg stage on artificial diet.

Tragidion armatum **LeConte**

[Subfamily:Cerambycinae]

SIZE. 2.0 cm.

DISTRIBUTION. Cass County (fig. 19).

HOSTS. *Yucca angustifolia* (Townsend 1892); *Yucca* spp., *Agave* sp. (Linsley 1962b); *Dasylirion* (Chemsak and Powell 1966).

COMMENTS. Adults collected on June 12. According to Chemsak and Powell (1966), the larvae feed in flowering scapes of various genera of Agavaceae, including *Agave, Dasylirion,* and *Yucca.* Newly hatched larvae begin to feed in the pith, constructing tunnels along the main axis of the scape. The galleries contain sections of tightly packed frass with intermittent empty spaces. Pupation takes place at the end of the feeding gallery in a broadened chamber next to the scape's surface. Townsend (1892) and Linsley (1962b) reported that 1 year was necessary for the development of this species. However, Chemsak and Powell (1966) indicated that material collected in California requires 2 years to undergo full development. In North Dakota, the probable host is *Yucca glauca* west of the Missouri River. The capture of this cerambycid in Cass County represents an accidental introduction or the existence of an unusual host in the immediate area.

Tylonotus bimaculatus **Haldeman —Ash and privet borer**

[Subfamily:Cerambycinae]

SIZE. 1.3 cm.

DISTRIBUTION. Barnes, Morton, and Ward Counties (fig. 20).

HOSTS. *Fraxinus* spp., *Carya, Liriodendron tulipifera* (Beutenmuller 1896); *Juglans nigra, Betula* (Knull 1946); *Ulmus, Ligustrum* (Linsley 1962a); *Fraxinus pennsylvanica.*

COMMENTS. Adults collected from July 16 to August 2. According to Craighead (1950), "The adults fly early in summer in the eastern and central States, laying the eggs beneath scales of bark on living or dying

ash trees or at the base of privet plants. In ash the young larvae feed principally in the bast tissue of the bark but when more fully matured go deeper, scarring the wood. In privet they mine more extensively beneath the bark and in the wood. They make broad meandering mines packed with granular frass which is not pushed out. Sap oozing from the wound marks the point of attack. In ash trees, first the large branches are usually attacked and killed and later the main trunk, but in privet these borers always mine the base. The pupal cell is constructed in or beneath the bark. The larval stage extends over a period of 2 years. In certain localities this insect becomes abundant and causes the malformation or death of many ash trees. Old, mature trees and drought-injured trees are attacked and gradually die branch by branch, especially those in parks or windbreaks. Privet hedges frequently suffer severely when these insects become abundant. A single larva is sufficient to kill an entire stem, and larvae are very difficult to find before the plant dies."

Wygant (1938) reported this borer infesting old trees suffering from lack of moisture. Tunnock and Tagestad (1973) found the larvae infesting healthy green ash shelterbelts in drier areas of North Dakota.

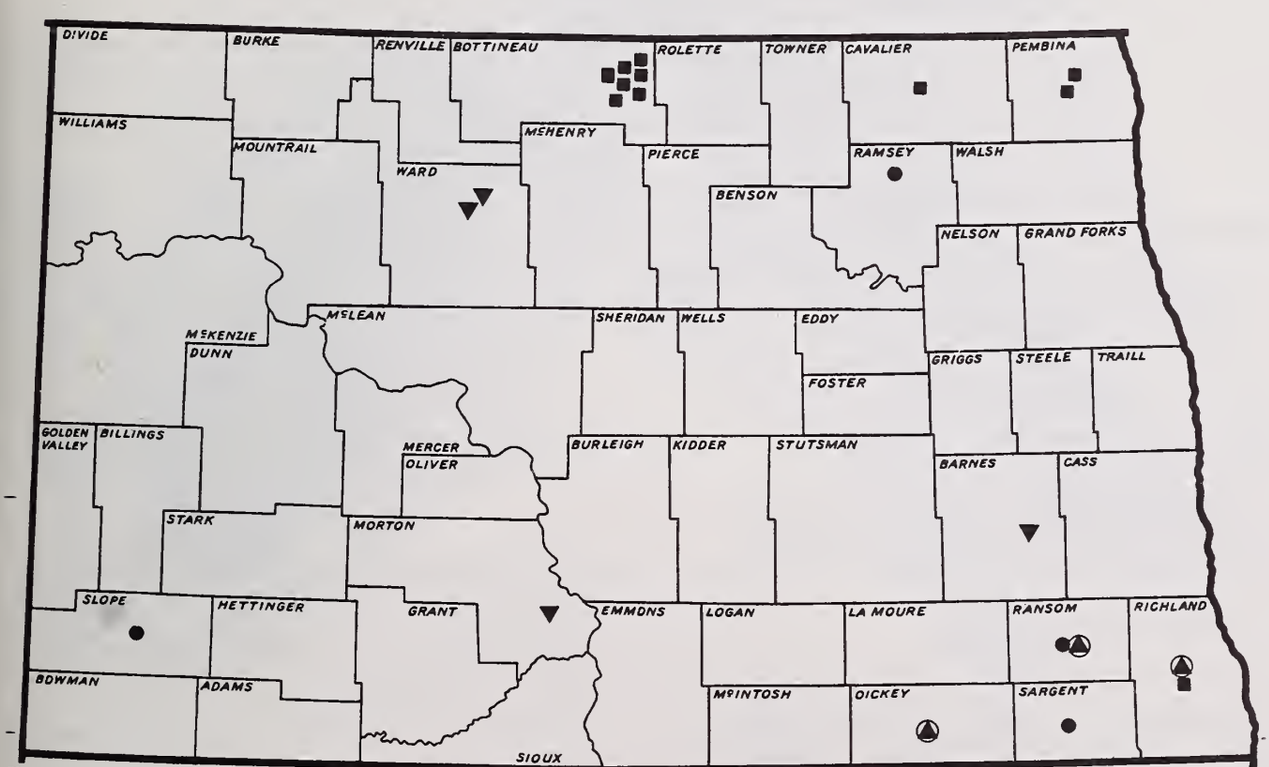


Figure 20.—Distribution of *Tylonotus bimaculatus* (▼), *Typocerus confluens* (▲), *Typocerus sinuatus* (●), and *Typocerus velutinus* (■).

Typocerus confluens **(Haldeman)**

[Subfamily:Lepturinae]

SIZE. 1.0 cm.

DISTRIBUTION. Dickey, Ransom, and Richland Counties (fig. 20).

HOSTS. *Carpinus, Juglans nigra, Fagus* (Knull 1946).

COMMENTS. Adults were collected from July 12 to 22. According to Knull (1946), this species has been reared from decayed beech logs and black walnut slash in Ohio. This species may infest decayed wood of boxelder in North Dakota.

Typocerus sinuatus **(Newman)**

[Subfamily:Lepturinae]

SIZE. 1.2 cm.

DISTRIBUTION. Ransom, Sargent, Slope, and Ward Counties (fig. 20).

HOSTS. Unknown.

COMMENTS. Nothing is definitely known about the host or feeding habits of this species. Records indicate that larvae may infest decaying hardwoods.

Typocerus sparsus LeConte

[Subfamily:Lepturinae]

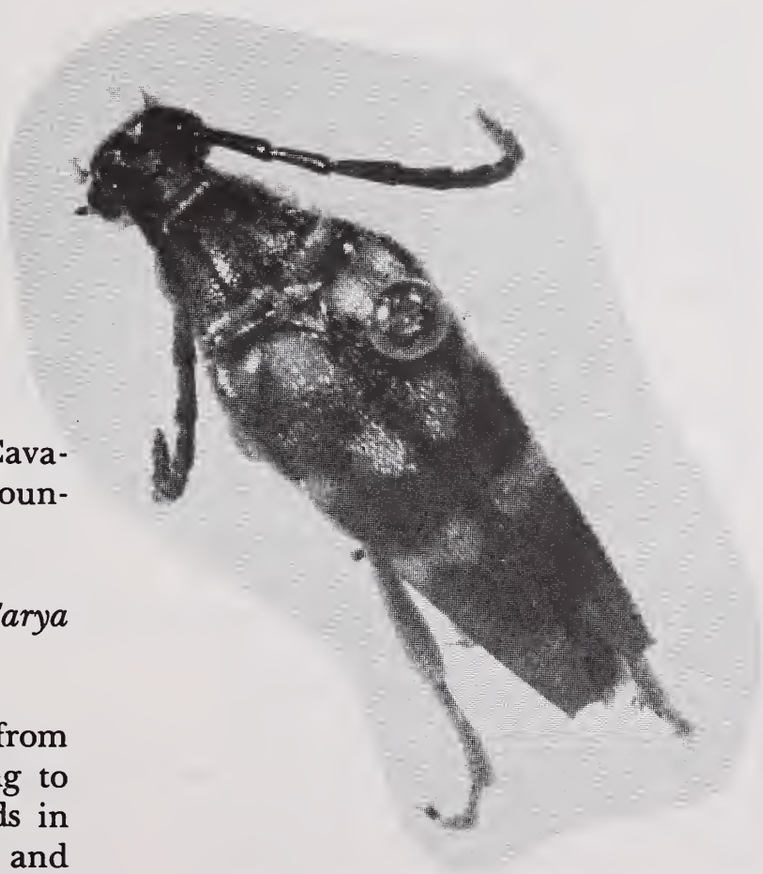
SIZE. 9.0 mm.

DISTRIBUTION. No specific designation other than North Dakota.

HOSTS. Unknown.

Typocerus velutinus (Olivier)

[Subfamily:Lepturinae]



SIZE. 1.1 cm.

DISTRIBUTION. Bottineau, Cavalier, Pembina, and Richland Counties (fig. 20).

HOSTS. *Betula* (Knull 1946); *Carya* (Blackman and Stage 1924).

COMMENTS. Adults collected from June 1 to August 16. According to Knull (1946), this species breeds in decayed wood of yellow birch, and hardwoods and conifers in general. Blackman and Stage (1924) reported rearing specimens from decayed hickory that had been dead 4 years. In North Dakota the adults have been taken in Malaise traps and on caragana and goldenrod (*Solidago* sp.) flowers. Gardiner (1970) reported successfully rearing this species from the egg stage on artificial diet.

Xylotrechus annosus annosus (Say)

[Subfamily:Cerambycinae]

SIZE. 1.0 cm.

DISTRIBUTION. Bottineau, Burleigh, and Cass Counties (fig. 21).

HOSTS. *Salix* spp. (Beutenmuller 1896); *Populus aurea, P. tremuloides* (Linsley 1964).

COMMENTS. Adults collected from June 10 to July 18. According to Keen (1952) and Baker (1972), this species breeds in aspen, poplar, and willow from the northeastern United States to the Rocky Mountains. Coquillett (1883) recorded the life cycle as being 1 year in willow—from April of one year to late May of the following year.

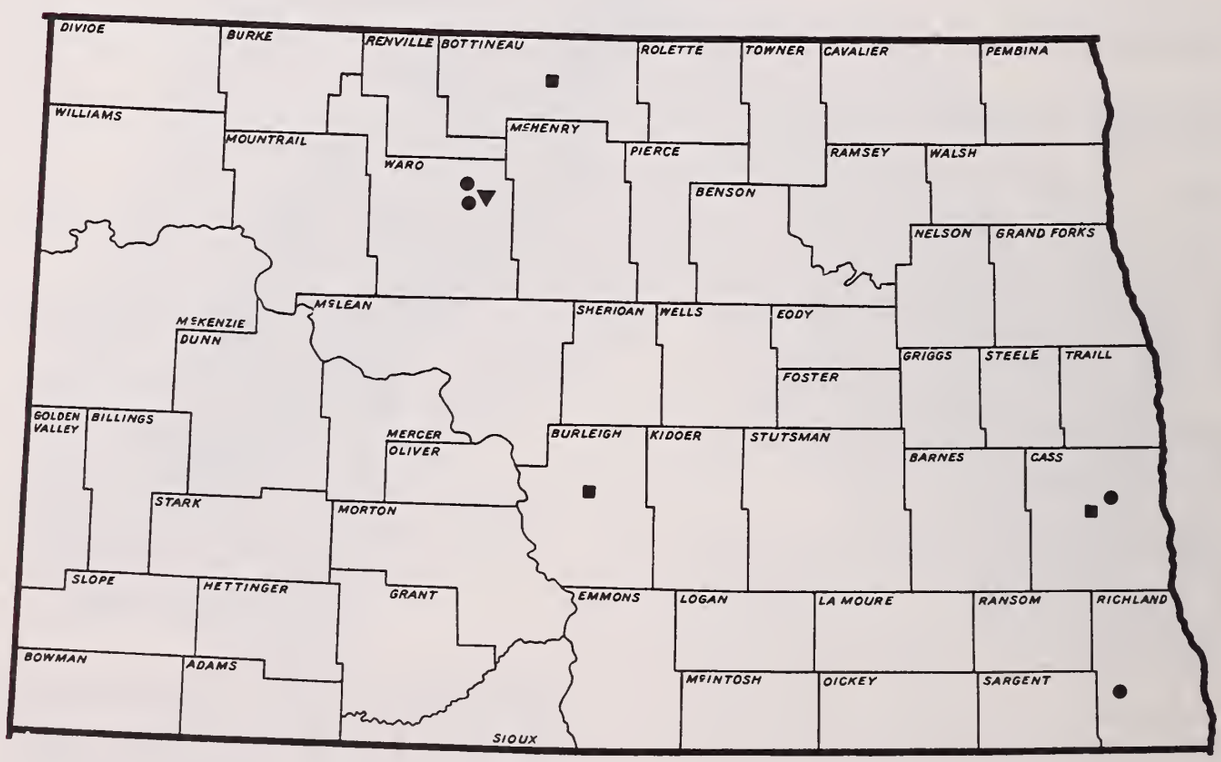


Figure 21.—Distribution of *Xylotrechus annosus annosus* (■), *Xylotrechus colonus* (●), and *Xylotrechus convergens* (▼).

Xylotrechus colonus **(Fabricius)—Rustic borer**

[Subfamily:Cerambycinae]

SIZE. 1.1 cm.

DISTRIBUTION. Cass, Richland, and Ward Counties (fig. 21).

HOSTS. *Acer* spp., *Quercus* spp., *Carya* (Beutenmuller 1896, Blackman and Stage 1924); *Tsuga canadensis* (Champlain et al. 1925); *Castanea, Fagus, Juglans, Fraxinus, Ulmus* (Linsley 1964); *Carpinus* (Chagnon 1940); *Betula* (Gardiner 1960); *Pinus virginiana* (Perry 1975).

COMMENTS. Adults were collected from June 17 to July 17. According to Gardiner (1960), mating and oviposition take place during the afternoon and on warm evenings. The eggs are laid beneath bark scales. Larvae feed on the inner bark, tightly packing the gallery with granular frass. The gallery varies somewhat with the amount of inner bark present. The wood surface of oak is deeply scored, whereas the gallery in birch is confined to the bark. Pupation takes place in the bark or the sapwood and lasts for approximately 20 days. The life cycle of this insect varies from 1 to 3 years depending upon environmental conditions (Craighead 1923, Blackman and Stage 1924). Craighead (1923) reported that the larvae will infest most of the eastern hardwoods; Champlain et al. (1925) reared adults from hemlock.

Chittenden (1894) found *X. colonus* parasitized by *Xorides rileyi* (Ashmead), Felt (1905) reported parasitism by *Melanobracon simplex* Cresson and *Arotes decorus* (Say), and Gardiner (1960) found pupal parasitism by the bracon *Helconidia ligator* (Say) and the entomogenous fungus *Isaria farinosa* (Dicks.) Fr. infecting larvae and pupae. Galford (1969) and Gardiner (1970) have both reported successfully rearing *X. colonus* on artificial diets.

Xylotrechus convergens **LeConte**

[Subfamily:Cerambycinae]

SIZE. 9.0 mm.

DISTRIBUTION. McHenry County (fig. 21).

HOSTS. *Crateagus* spp. (LeConte 1880).

COMMENTS. According to Craighead (1923), the larvae completely honeycomb the heartwood of dead *Crateagus* and pupate in late spring. However, in North Dakota we have observed attacks in live *Crateagus* near dead branches. This particular host material was caged on February 25 and the adults emerged on October 17 of the same year. From this rearing material emerged the ichneumon *Rhorus* sp.

Xylotrechus undulatus **(Say)**

[Subfamily:Cerambycinae]

SIZE. 1.4 cm.

DISTRIBUTION. No specific information other than North Dakota.

HOSTS. *Picea* spp., *Abies balsamea, Pseudotsuga taxifolia, Pseudotsuga macrocarpa, Larix* (Keen 1952, Baker 1972); *Pinus, Tsuga* (Craighead 1923).

COMMENTS. According to Baker (1972), *X. undulatus* breeds in recently cut balsam fir, larch, hemlock, and spruce in the northern tier of States. Dillon and Dillon (1961) reported that the larvae feed under bark of almost any dead hardwood or conifer. Craighead (1923) states that a suitable site for attack would be an old fire scar or ax wound where the larvae can gain entrance to the heartwood. Gardiner (1970) has successfully reared this species on a modified McMorran spruce budworm diet.

Acer negundo **(Boxelder)**
Astyleiopus variegatus
Hyperplatys maculata
Sternidius alpha misellus

Acer **spp. (Maple)**
Aegoschema modestum
Bellamira scalaris
Clytus ruricola
Cyrtophorus verrucosus
Elaphidion mucronatum
Elaphidionoides villosus
Eutetrapha tridentata
Neoclytus acuminatus acuminatus
Parandra brunnea brunnea
Purpuricenus humeralis
Saperda lateralis lateralis
Sternidius alpha

Alnus rugosa **(Speckled alder)**
Clytus ruricola
Purpuricenus humeralis

Amelanchier alnifolia **(Juneberry)**
Hyperplatys aspersus
Saperda candida bipunctata

Ambrosia **spp. (Ragweed)**
Dectes texanus texanus

Artemisia **spp. (Sage)**
Crossidius pulchellus

Asclepias **spp. (Milkweed)**
Tetraopes annulatus
Tetraopes femoratus
Tetraopes tetraophthalmus

Betula **spp. (Birch)**
Clytus ruricola
Cyrtophorus verrucosus
Elaphidionoides villosus
Neoclytus acuminatus acuminatus
Purpuricenus humeralis
Strangalia famelica
Typocerus velutinus

Cactaceae (Cactus)
Moneilema annulatum

Caragana arborescens **(Caragana)**
Astyleiopus variegatus

Celtis **spp. (Hackberry)**
Elaphidion mucronatum
Elaphidionoides villosus
Neoclytus acuminatus acuminatus

Chrysothamnus nauseosus **(Rabbitbrush)**
Crossidius coralinus

Cornus **spp. (Dogwood)**
Elaphidion mucronatum
Oberea tripunctata
Psenocerus supernotatus

Crataegus **spp. (Hawthorn)**
Saperda candida bipunctata
Xylotrechus convergens

Fraxinus pennsylvanica **(Green ash)**
Hyperplatys aspersus
Neoclytus acuminatus acuminatus

Fraxinus **spp. (Ash)**
Obrium rufulum
Saperda lateralis lateralis
Tylonotus bimaculatus

Gleditsia triacanthos **(Honeylocust)**
Astyleiopus variegatus
Neoclytus acuminatus acuminatus

Gutierrezia sarothrae **(Broomweed)**
Crossidius pulchellus

Larix **sp. (Larch)**
Monochamus scutellatus
Neoclytus muricatulus muricatulus

Lonicera **sp. (Honeysuckle)**
Neoclytus acuminatus acuminatus

Malus **spp. (Apple)**
Elaphidion mucronatum
Elaphidionoides parallelus
Elaphidionoides villosus
Hyperplatys aspersus
Hyperplatys maculata

Neoclytus acuminatus acuminatus
Oberea tripunctata
Saperda candida bipunctata
Sternidius alpha

Ostrya virginiana **(Ironwood)**
Clytus ruricola
Cyrtophorus verrucosus
Neoclytus acuminatus acuminatus

Parthenocissus inserta **(Virginia creeper)**
Astyleiopus variegatus

Picea **spp. (Spruce)**
Arhopalus foveicollis
Monochamus scutellatus
Neoclytus muricatulus muricatulus
Pogonocherus mixtus

Pinus **spp. (Pine)**
Arhopalus foveicollis
Batyle ignicollis ignicollis
Bellamira scalaris
Hyperplatys maculata
Monochamus clamator clamator
Monochamus maculosus
Monochamus scutellatus
Monochamus titillator
Neoclytus muricatulus muricatulus
Pogonocherus mixtus
Xylotrechus undulatus

Populus **spp. (Poplar)**
Bellamira scalaris
Elaphidion mucronatum
Hyperplatys aspersus
Hyperplatys maculata
Mecas inornata
Oberea tripunctata
Parandra brunnea brunnea
Plectrodera scalator
Saperda calcarata
Saperda concolor
Saperda vestita
Stenocorus schaumi

Populus deltoides **(Cottonwood)**
Astyleiopus variegatus
Plectrodera scalator

Populus tremuloides **(Aspen)**
Oberea quadricallosa
Xylotrechus annosus annosus

Prunus americana **(Wild plum)**
Hyperplatys aspersus

Prunus pensylvanica **(Pin cherry)**
Cyrtophorus verrucosus
Hyperplatys aspersus

Prunus virginiana **(Chokecherry)**
Cyrtophorus verrusosus
Psenocerus supernotatus
Ropalopus sanguinicollis

Prunus **spp. (Plum; Cherry)**
Elaphidionoides parallelus
Elaphidionoides villosus
Neoclytus acuminatus acuminatus
Oberea tripunctata
Psyrassa unicolor
Ropalopus sanguinicollis
Saperda candida bipunctata
Saperda lateralis lateralis

Pyrus **spp. (Pear)**
Cyrtophorus verrucosus
Elaphidion mucronatum
Neoclytus acuminatus acuminatus
Parandra brunnea brunnea
Pogonocherus mixtus
Prionus imbricornis
Saperda candida bipunctata

Quercus **spp. (Oak)**
Batyle suturalis suturalis
Clytus ruricola
Cyrtophorus verrucosus
Elaphidion mucronatum
Elaphidionoides incertus
Elaphidionoides parallelus
Elaphidionoides villosus
Enaphalodes cortiphagus
Megacyllene angulifera
Neoclytus acuminatus acuminatus
Obrium rufulum
Parandra brunnea brunnea
Prionus imbricornis
Psyrassa unicolor
Purpuricenus humeralis
Saperda lateralis lateralis
Sternidius alpha
Strangalia famelica
Xylotrechus colonus

***Rhus glabra* (Smooth sumac)**
Sternidius alpha

***Rhus* spp. (Sumac)**
Elaphidion mucronatum
Elaphidionoides villosus
Hyperplatys aspersus
Psenocerus supernotatus

***Ribes* spp. (Currant)**
Oberea tripunctata
Psenocerus supernotatus

***Rubus* spp. (Raspberry)**
Oberea basalis
Oberea bimaculata

***Sorbus* sp. (Mountain-ash)**
Clytus ruricola
Prionus imbricornis
Saperda candida bipunctata

***Salix* spp. (Willow)**
Hyperplatys aspersus
Mecas inornata
Oberea quadricallosa
Plectrodera scalator
Pogonocherus mixtus
Pogonocherus parvullus
Psenocerus supernotatus
Saperda calcarata
Saperda concolor
Saperda mutica
Xylotrechus annosus annosus

***Syringa* spp. (Lilac)**
Neoclytus acuminatus acuminatus

***Tilia americana* (Basswood; Linden)**
Aegoschema modestum
Clytus ruricola
Cyrtophorus verrucosus
Hyperplatys maculatus

***Tilia* sp. (Basswood; Linden)**
Elaphidion mucronatum
Elaphidionoides villosus
Parandra brunnea brunnea
Saperda calcarata
Saperda lateralis lateralis
Saperda vestita

***Toxicodendron radicans* (Poisonivy)**
Astyleiopus variegatus

***Ulmus americana* (American elm)**
Anoplodera minnesotana
Eutetrapha tridentata
Neoclytus acuminatus acuminatus
Parandra brunnea brunnea
Physocnemum brevilineum

***Ulmus pumila* (Siberian elm)**
Hyperplatys aspersus

***Ulmus* sp. (Elm)**
Anoplodera minnesotana
Elaphidionoides villosus
Oberea tripunctata
Physocnemum brevilineum
Psenocerus supernotatus
Saperda lateralis lateralis
Tylonotus bimaculatus
Xylotrechus colonus

***Viburnum* spp. (Viburnum)**
Oberea tripunctata

***Vitis* spp. (Grape)**
Cyrtophorus verrucosus
Elaphidion mucronatum
Elaphidionoides parallelus
Elaphidionoides villosus
Neoclytus acuminatus acuminatus
Prionus imbricornis
Psyrassa unicolor

***Xanthium italicum* (Cocklebur)**
Dectes texanus texanus

***Yucca* spp. (Yucca)**
Tragidion armatum

Soybeans
Dectes texanus texanus

Maize
Prionus fissicornis
Prionus imbricornis

Native grasses
Prionus fissicornis

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